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TORONTO

ALCOHOL AND LIFE

A MANUAL OF SCIENTIFIC TEMPERANCE
TEACHING FOR SCHOOLS

BY

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*Covering the requirements of the "Temperance" Syllabuses
of the Board of Education, England and Wales;
the Scotch Education Department; and the
National Board of Education, Ireland*

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PREFACE.

It is the object of the public elementary school, as set forth by the leading educational authorities, to form and strengthen the character, to develop the intelligence of the children, and to assist boys and girls to fit themselves practically as well as intellectually, for the work of life. In order that these objects may be attained it is necessary that children should be acquainted with the elementary laws of health and should have some knowledge of the action of alcohol and similar drugs. This has been recognised and acted on for several years in different countries.

In the United States such teaching, under Government control, has been compulsory for over a quarter of a century. In Canada, Australia, and South Africa it is also embodied in the educational curriculum. A decree by the French Minister of Education in 1902 made instruction regarding the nature and effects of alcohol compulsory in all Government schools. Similar instruction is now given in the schools of nearly all European countries, Sweden and Switzerland being conspicuous for the completeness of their methods. By the issue of a Syllabus of "Temperance" teaching the English Board of Education, the Scotch Education Department, and, more recently, the Commissioners of

National Education in Ireland, have also recognised the value and importance of this instruction.

The present work has been prepared to meet the demand for an up-to-date text-book which will present in simple language the ascertained scientific facts regarding alcohol. Unnecessary details have been avoided and care has been taken that the teaching is accurate in its statement of facts and suitable in its manner of presentation. The argument, as the title indicates, is biological, the object aimed at being to show the effects of alcohol on life and living processes. Chemical data which are beyond the scope of school children have been excluded, and the work contains no pathological descriptions or illustrations of organs diseased by alcohol. Such teaching is not only unnecessary but may be actually harmful.

In the preparation of these lessons all available text-books on the subject have been consulted. Special reference may be made to the admirable *Manuel d'Enseignement Antialcoolique*, by Jules Denis, of Geneva, on which the present work is largely modelled. *Aus frischem Quell*, the reading and lesson book of the Swiss Union of Abstaining Teachers, and the French manuals, especially the elaborate work of Langlois and Blondel, have been found suggestive. The various American text-books have been laid under contribution, the Gulick Hygiene Series in particular, while the continual assistance derived from the excellent notes appended to the syllabus of the English Board of Education should be acknowledged.

It is hoped that this work may be of service to those who desire a manual written from the standpoint of the pupil and based on several years' experience in

supervising the instruction of school children in this subject.

My thanks are due to the Rev. Dr. J. Macmillan of Belfast for his continual help and encouragement, and to Mr. R. M. Jones, M.A., Headmaster of the Royal Belfast Academical Institution, and the Rev. C. E. Quin, M.A., for their kindness in reading the manuscript and for many valuable suggestions, also to Mr. S. R. Bolton for his assistance in preparing several of the illustrations.

JOHN A. HUNTER.

BELFAST, *October*, 1917.

PREFACE TO SECOND EDITION.

THE demand for a second large edition of this work within a few weeks of its first publication is a gratifying proof that it fulfils the object for which it was written. Opportunity has been taken to make a few corrections and additions.

The book has been carefully re-read in the light of the recent scientific report of the Committee of the Central Control Board. It will be found to embody, in simple form, the more important findings of this report as regards the physiological action of alcohol.

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PART I.

ALCOHOL AND THE LIVING CELL.

LESSON I.

THE LAWS OF LIFE.

1. Have you ever thought what a fine thing it is to be strong and healthy? When you are in good health you are able to do your lessons well and when they are finished you are eager to run about and play. You are always hungry when meal-time comes and you enjoy your food. At night you are tired and sleep soundly and when you wake up in the morning you feel quite fresh and are ready for another day's work and play. All this means that you are in good health, or, in other words, that all the parts of your body are in good order and are working properly.

2. How different it is when you are sick or hurt in any way, that is, when some part of the body is not doing its work at all or doing it badly. Then you feel that you are not able to read or learn anything and you would rather sit still or lie down than go out and play. You can scarcely eat any food no matter how nicely it may be prepared. Perhaps you are not able to sleep on account of some pain or uneasy feeling, and, in the morning, instead of being rested and refreshed, you feel worse than ever. Not until the part which has been

doing its work badly begins again to do it properly do you feel well and happy once more.

3. All the parts of the body depend on one another and one part cannot go wrong without affecting the others. It is important, therefore, to know something about the various ways in which the body may be injured or damaged so that we may be able to take care of it.

4. Our body may be injured from within or without. We may meet with some accident or we may suffer from some disease which attacks us, often in spite of every care we may take to avoid it. Some people through ignorance injure their bodies from within by taking substances which are harmful and even dangerous. Shakespeare described such people when he wrote of those who "put an enemy in their mouths to steal away their brains."

5. In every well-governed country there are certain laws which people must obey, and anyone who breaks one of these laws is punished. There are also certain laws of nature which must be obeyed otherwise punishment will follow swiftly and surely. Many illnesses and accidents are caused by the neglect or breaking of these laws, sometimes wilfully, but more often through ignorance. It is important, therefore, that we should learn something of these laws so that we may avoid doing anything which would hurt the body or injure the mind or hinder us in any way from leading happy and useful lives.

6. All children should learn something of these laws as early as possible so that they may begin to obey them while they are young. In this way they will form good habits. **The word habit really means something that**

a person has. When we do a thing so often that we come to do it almost without thinking then it has become a habit. It is something that we have ; it belongs to us. If through ignorance or bad example a bad habit is formed, then to get rid of it is very difficult. It is just as easy to form good habits as to form bad ones, and the best time to do this is when we are young. If we form good habits we benefit not only ourselves, but, directly or indirectly, others as well. Bad habits, on the other hand, often cause bad health, bad work, or neglect of duty, and are harmful not only to ourselves but to those about us.

7. Among the substances which injure the body from within are such drinks as beer, wine, and spirits, and they do so because they contain a dangerous poison called Alcohol, which is harmful to all living creatures. Many people do not know this, and they go on drinking these substances because they have learned to like them and they think that they help the body in some way, such as providing it with food, or keeping it warm or protecting it against illness. No drink containing alcohol does any of these things, but, on the contrary, injures and harms the body in many ways. It is important, therefore, to know the truth about alcohol, so that we may not allow it to harm us through ignorance of its real nature and effects.

8. It is especially important that children and young people should know this, because if the habit of drinking is learned while young it almost always grows. Alcohol is always harmful to young people, even in the smallest quantities, as it prevents their food from doing them as much good as it should, and it hinders the growth both of the body and mind. They should therefore never

drink alcoholic beverages of any kind. They should always remember that we cannot harm our bodies by refusing to take these beverages, because the body does not require them. When grown up they will find it better to do without them and to spend their money more wisely. Those who study these lessons will learn many good reasons why they should avoid alcohol entirely.

LESSON II.

THE NATURE AND EFFECTS OF ALCOHOL.

1. Pure alcohol is colourless and looks like water. It differs, however, from water in several ways. It has a peculiar smell which water has not. It has a burning taste ; no one could drink pure alcohol because of the pain and injury it would cause in the mouth, throat, and stomach. For this reason people make it weaker by mixing it with water and other liquids, and in this way alcoholic liquors are produced. These differ in the amount of alcohol they contain, there is some in beer, more in wine, and a great deal in spirits. In a bottle of whisky or brandy nearly half the contents will be pure alcohol. Even when diluted to half its strength it still inflames and irritates the delicate skin inside the body.

2. Alcohol will burn ; we can easily set fire to brandy and whisky which contain a good deal. Beer, on the other hand, will not burn, because the spirit in it is much more diluted. But people can do themselves as much harm by drinking beer or stout as by drinking whisky or brandy, because they usually take a greater quantity of the beer or stout, and so get as much alcohol as the

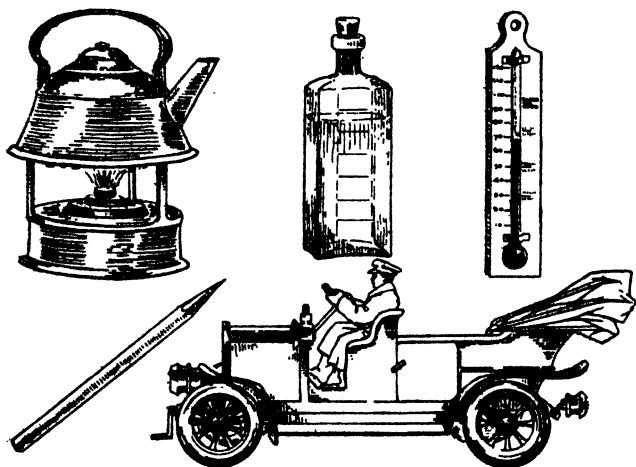
whisky drinker. It should be clearly understood that the harmful effects of alcohol are only weakened and not destroyed by mixing it with water and other things as in alcoholic beverages. **A pint of beer may contain as much alcohol as a strong glass of whisky and water and may therefore be as injurious to the body.**

3. Alcohol has been called the thirstiest substance in the world, because it absorbs or soaks up water from everything with which it comes in contact. If a piece of meat or vegetable is placed in alcohol it becomes dry and hard and tough because the alcohol takes nearly all the water out of it. Alcohol cannot dissolve food, but makes it dry and hard and quite useless. In the same way when taken into the body it dries it up by absorbing the water out of the different tissues. Thus it causes the body to lose water. It therefore makes a person thirsty in somewhat the same way as he becomes thirsty after perspiring freely, for thirst is simply the call of the body for more water. It is clear from these facts that those who take alcoholic beverages for the purpose of quenching thirst do a very foolish thing, for thirst is not satisfied in this way but actually increased.

4. **Alcohol in its proper place is one of the most useful substances in the world.** It is said to be the most important chemical next to water. As it burns well with a great heat and gives out no smoke nor smell, it is used in spirit lamps and to drive motor engines. As it absorbs water it is used to dry and harden substances, and for this reason many things are preserved in alcohol in museums and similar places. It will dissolve many things that water will not dissolve, and for this reason chemists use it to purify drugs and to prepare medicines. It is almost impossible to freeze alcohol, and for this

reason it is used in thermometers where it is necessary to measure very low temperatures.

5. Alcohol is used in about a hundred different trades and manufactures. It is used in the making of perfumes, varnishes, dyes, drugs and many other things. Few people would imagine that alcohol is used in the



GROUP OF ARTICLES IN WHICH ALCOHOL IS USEFUL.

making of pencils, yet what is called "lead" in a pencil is really a black powder which is held together by a special varnish and this varnish is dissolved in alcohol. In war time alcohol is used in the making of explosives ; it takes a ton and a half of alcohol to make a ton of smokeless powder. It enters into the manufacture of hundreds of useful articles all of which would be cheaper if the alcohol used in the manufacture of alcoholic drinks were used in this way. Thus the alcohol would be a blessing to mankind and not a source of harm and loss.

6. Alcohol taken into the human body acts as a poison. A poison is a substance which injures health or destroys life. Alcohol does both. We shall learn how it injures the healthy growth and development of both plants and animals, even when used in small quantities, and how it kills them altogether when used for a long period or in larger amounts. Nearly all the common beliefs which people hold about alcohol are contrary to the teachings of science. Most people think that alcohol is a stimulant, that is, a substance that increases the activity of body and mind. It is the exact opposite of this, and diminishes the power to work of both body and brain. Instead of making the body warmer it makes it colder by causing it to lose heat. Instead of giving strength it produces weakness, instead of causing happiness it only makes a man indifferent to his misery. Why, then, are people deceived with regard to it? We shall learn the answer to this when we study its action on the brain. Its action as a poison is principally on that part of the brain by which a person is able to control his power of reason and judgment. A person who has taken alcohol is not able to reason clearly nor to judge correctly, and he cannot distinguish between what is true and what is false. Alcohol deceives the brain.

LESSON III.

THE TINY ANIMAL THAT LIVES IN A DROP OF WATER AND WHAT IT TEACHES US.

1. In order to study any subject properly it is necessary to begin at the very beginning. Before you are able to read you must first know the letters. Before

you can do even the simplest sum you must first know the figures. And before you can play a piece of music you must know the notes. In the same way, in order to understand how alcohol injures life we must begin at the very beginning by studying the simplest forms of life which exist.

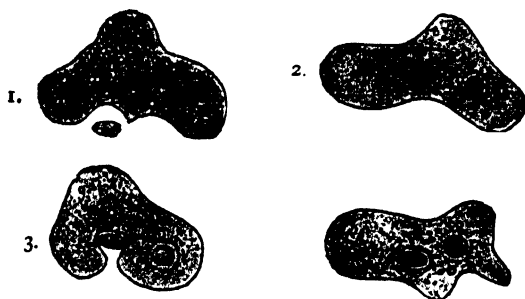
2. There are thousands of living creatures so small that it is impossible to see them with the naked eye. But by the aid of an instrument called a microscope which makes them seem several hundred times larger than they really are, we are able to see them easily and to observe how they live and move and have their being. We can also study the effect of anything that interferes with their life or movement. From these tiny creatures we learn the important lesson that all life is the same everywhere and the laws that govern one life are the laws that govern all lives. The life of an animal so small that it can live in a single drop of water can teach us lessons which, if we understand them properly, may influence our whole character and conduct.

3. If we take some water from a pool and examine a drop of it under a microscope we may find in it a little particle of jelly-like substance that at first appears to have no life. But if we watch it for a time we see that its shape gradually changes and it moves slowly about. We discover that it is alive and, humble though it may be, it is able to exist by itself, to move about, to feed and to grow. The little mass of jelly is a cell, and the tiny living being is an animal which consists of only one cell.

4. This creature, which is almost the simplest type of life known, is called the Amoeba, from a Greek word meaning change, because it is always changing its shape.

ANIMAL THAT LIVES IN A DROP OF WATER 9

When it moves it does so by pushing out different parts of its body and then dragging the rest after them. Each movement is graceful and gentle. As it moves along it gathers food. When it stretches itself out an arm touches some tiny scrap of food. Then it gradually draws its body up till it surrounds it, it really throws itself round about it, till the scrap of food passes into the little mass of jelly and disappears. Like the lion or tiger, it has captured its prey and devoured it.



AMOEBA AND FOOD PARTICLE.

The latter has been completely engulfed in the last figure.

5. All living creatures may be divided into two groups: (1) those that consist of only one cell and (2) those that consist of more than one cell. There are millions of single-celled animals. Some are larger and some smaller, but none of them has either head or tail or bones or muscles. Yet they all live and grow and are subject to the laws of life. In the second group are all living things that are composed of more than one cell, of every size and shape, upon the earth, or in the water, or in the air. The larger living creatures such as worms, beasts, birds, or men belong to this many-celled group.

6. All living cells can be killed or injured. If the little jelly-like animal in the drop of water is starved it draws in the parts which are pushed out, shrivels up and stops moving. If the very tiniest amount of alcohol is added to the water in which it is moving it has the same effect. All cells are really alike and all poisons such as alcohol act on all cells in the same way. If we put this tiny animal into four tablespoonfuls of water (that is, nearly 1000 drops) and add one single drop of alcohol we find that it causes it to curl up slowly, that it is poisoned for the time being and stops moving. One drop of alcohol in one thousand drops of water injures the living cell whether it is the cell of an animal so small that it can live in a single drop of water or the cell in the brain of the cleverest man in the world. Thus we learn from the study of one of the simplest forms of life that alcohol is a cell poison.

LESSON IV.

HOW ALCOHOL INTERFERES WITH THE GROWTH OF CELLS.

1. All living things grow and develop, and it is of the greatest importance that nothing should be allowed to hinder this growth. Alcohol not only injures living cells but it also lessens their power to grow and develop. A plant or animal will not become bigger unless the cells of which it is composed grow and multiply, and both these processes are hindered by alcohol.

2. One drop of alcohol in one thousand drops of water is about one drop in a wineglassful. This is not a very strong solution yet a little of it is enough to hinder the

growth of seeds and plants, because even such a small quantity is harmful to the living matter of the vegetable cells. It not only hinders the growth of seeds, but it prevents the formation of the green colouring matter in plants. Two cuttings of a geranium plant were taken. One was sprinkled with pure water and the



The pot on the right hand shows seeds grown with water only.

The pot on the left hand shows seeds grown with water to which $\frac{1}{2}$ per cent. alcohol has been added (one teaspoonful of alcohol to 25 ounces of water).

(Experiment by the late J. J. Ridge, M.D.)

other with water containing ten drops of alcohol in a pint. At the end of six weeks the second plant was only half the size of the other. There was less colouring matter in the leaves and the lower leaves withered very early.

3. Experiments have also been made with cress seeds and mustard seeds. They were planted in different glass tubes or vessels and some were given water and others water containing alcohol in different amounts.

In every case the seeds failed to grow according to the amount of alcohol in the water. When there was the one-hundredth part in the water the seeds were killed.

4. It is quite easy to perform these experiments for yourself. Mix up a suitable soil for plants such as geraniums or for such seeds as onions. Plant them out in pots and proceed as follows : Add to the first water only, to the second water containing one part of alcohol in 100 ; the third one in 500 ; and the fourth one in 1000. You will see that the growth will be less in proportion to the amount of alcohol in the water.

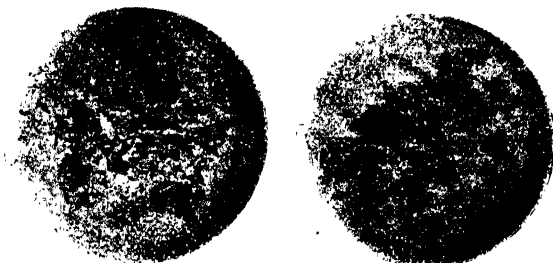
5. Have you ever seen frogs' eggs floating on ponds in spring ? The eggs are sticky and cling together in great lumps surrounded by masses of clear jelly. This jelly is the same substance as white of egg. These eggs develop into tadpoles and these in their turn grow into frogs.

Take a portion of this mass of eggs and jelly and place it in a saucer in ordinary water. Then place another portion in a saucer in water containing ten drops of alcohol in each ounce. Let them be placed in a window where they will get as much sunshine as possible. As the sun is generally feeble in March and April they will need all the warmth they can get. The result in the two saucers will be very different. In the saucer where water is used the tadpoles will develop just as they would do if left in the pond. But in the other many eggs will not develop at all and any tadpoles that are hatched are small and feeble. Moreover, if they are watched it will be found that they do not grow so well as those in the pure water. At the end of a fortnight the latter will be nearly twice the size.

6. It has been found that when hen's eggs are painted with a mixture of alcohol and water the chickens were

Water.

Water and 2 % Alcohol.

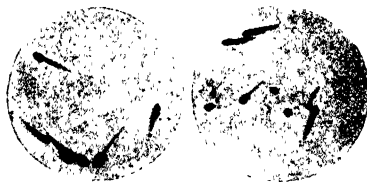


FROG'S SPAWN, after 6 days.

Showing many more Tadpoles' patches where water only was used.

Water.

Water and 2 % Alcohol.



TADPOLES, 14 days old.

Showing the greater development of those untreated with alcohol.

Water.

Water and 2 % Alcohol.



TADPOLES, 6 weeks old.

Showing the marked difference in size.

either dead in the shell or if hatched were very small and feeble and lived only a short time. Experiments

with young puppies and kittens show the same results. If they are allowed to have food which contains small quantities of alcohol they do not grow or develop. They do not play about like healthy young animals, they are dull and half asleep and have no energy.

7. All these experiments show that **alcohol hinders growth**, and it is probably harmful to the living matter in our bodies in somewhat the same way as it is harmful to the living matter in plants and animals. Alcohol cannot help the body to grow, but rather tends to hinder healthy growth and development.

LESSON V.

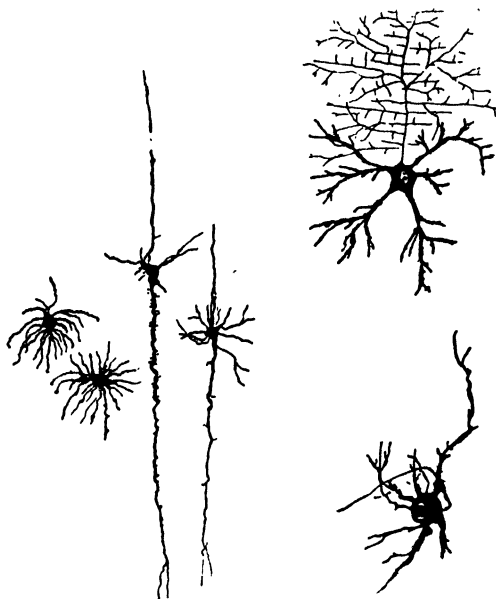
THE KINGDOM OF THE CELLS.*

1. The human body with all its different parts may be compared to a great nation. As a nation consists of so many millions of citizens, so the human body consists of millions of cells. Moreover, we find certain cells set apart to do certain work. Some carry messages to the brain, some act as blood cells, some help us to breathe—that is to take in and use the part of the air the body requires—and so on. As in a nation there is division of labour among its citizens, each working at his own task, so also is it in the kingdom of the cells. As the wisest and cleverest men are appointed to rule the country, so in the human body the finest and most delicate cells perform a similar task. We have even a similar division of responsibility as in a nation of men and women. The

*Adapted from *Aus frischem Quell*, the reading and lesson-book of the Swiss Union of Abstaining Teachers.

will is the highest authority, and the understanding, reason, and judgment act as law-givers and judges.

2. The government of every properly administered country maintains a great number of duly appointed officials who are always at its disposal and whose duty



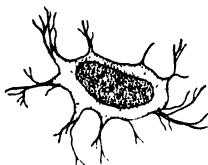
DIFFERENT TYPES OF NERVE CELLS.

it is to make known the various laws and to see that these are duly carried out and obeyed. There are also other officials whose duty it is to take note of everything that would endanger the peace or security of the nation or of its citizens. In like manner we find that the human body possesses cells which perform similar duties of protection. Is anything flung at the head, then

the sentries in the front of the head, the eyes, telegraph to the governing department, "Something dangerous is coming." Immediately the highest authority sends the



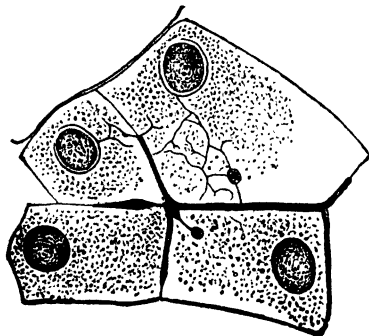
GLAND CELLS.



BONE CELL.

necessary messages to a great number of muscles in the neck, the back, the arms, and the legs. As quick as lightning these obey the orders they receive and the missile which would have struck and injured the head

is avoided and flies harmlessly past.



CELLS.

The dark channels between the cells are the bile vessels or ducts (Luciani).

3. But every nation possesses other citizens who have nothing to do with the government but who work for the common good and for the welfare of the community as a whole. So in our body the cells which are packed into organs have also their duty to perform. By

a network of railways (the blood-vessels) with great main lines (the arteries) and innumerable little lines branching off them, the food material which nourishes and warms the body is conveyed by millions of little

waggon (the blood corpuscles) and reaches the most remote corner of the cell kingdom. And from all parts is collected waste and worn-out material which the little waggon carries back to the special stations where it is finally disposed of.

4. Other groups of cells are like factories and provide for the nourishment of the body. First the raw material, that is, the food, is broken up into small particles, packed up and despatched to the central department—the stomach—where it is altered into the form in which it will be most serviceable to the cell kingdom. In this work the different chemical factories of the body, with their products, take part. When all the valuable and nourishing part is separated from the food it is conveyed by the railway system—the blood circulation—to the innumerable tiny rooms and chambers where it is built up in mysterious fashion into the fabric of the body.

5. Every nation possesses an army of soldiers to defend it against its enemy, and in every city there are policemen to protect the citizens against evildoers who would injure their lives or property. So in the body there are police and soldier cells who defend it against its enemies who attack it. We shall learn all about these in a separate lesson.

6. How does alcohol find its way into the cell kingdom? It goes, like the food, by way of the mouth into the central department or stomach. In the walls of the stomach are numerous small blood-vessels through whose delicate walls the alcohol quickly passes. Now it is carried by the little blood waggon through the railway system and thus it passes by means of the blood stream through the whole body. In the blood it interferes with the blood cells and hinders them in their work. It paralyses and

weakens those blood cells especially which act as defenders of the body against disease. It injures the walls of the blood-vessels and after a time they become



A NERVE CELL FROM THE CEREBELLUM OR SMALL BRAIN (Luciani).

hard and brittle, so that if an extra strain is put on them they are liable to give way. This happens most often in the brain.

7. Alcohol conveyed in this way throughout the body goes to every organ, and in some cases to every cell.

Here it injures and destroys the living matter of the cell and weakens its vitality. Moreover, the finest and most complex cells, those of the brain and nerves, are the first to be injured, and these cells on account of their delicate structure suffer the greatest harm. This effect of alcohol is so well known that people say, "It goes to the head," that is, it stupefies and benumbs the senses.

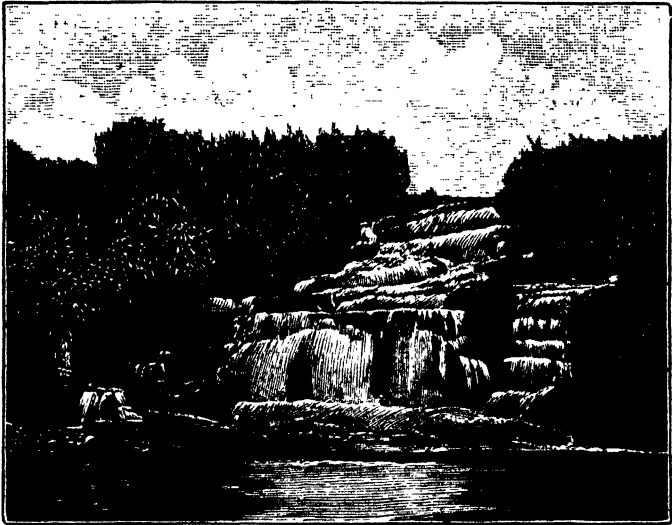
8. In other organs of the body alcohol destroys the vital cells and causes the organs to shrink and shrivel up and to become diseased. They are thus unable to do their work, and in this way the whole cell kingdom suffers. Is it any wonder that the work of the body is badly done when the stomach cells are thrown out of order, the vitality of heart and lung cells weakened, and the brain cells poisoned? The greater the quantity of alcohol taken into the body, the more destructive and the more widely spread are its harmful effects. Enough may be taken to cause death in a few hours; the life of the cells is rapidly destroyed, the poison attacks them in such quantity that they are unable to resist even for a time. Or the result may be longer delayed; it may be spread over a period of years, but sooner or later the enemy gains the upper hand and the workers of the cell kingdom cease work for ever.

LESSON VI.

WATER: THE DRINK PROVIDED BY NATURE.

1. The human body and all living things require air, food and water. All these are provided in abundance by nature because they are all necessary for life and health. Alcohol, for use as a drink, is not found

anywhere. You may search the world over and you will find no well or spring or stream of alcohol. If it had been required to maintain life nature would have provided a supply. Water is found in all parts of the world. It is the best fluid to drink, and neither man, plants nor



THE DRINK PROVIDED BY NATURE.

animals can live without it. A plant or tree will wither and die if deprived of water, and the human body will also die if it cannot obtain water. To be deprived of water is even more terrible than to be deprived of food. Travellers in desert places or shipwrecked persons suffer much more from thirst than from hunger.

2. Water forms about two-thirds of the weight of the body. The blood is mainly composed of water, and when a person loses a good deal of blood one of the

first things which is complained of is thirst. When the body loses water in any way, as when we perspire, it calls for a fresh supply and this is what we call thirst. **When one is thirsty it is a thirst for water and not for any other liquid,** and the less water in any beverage the less it satisfies thirst. Water is the only thirst quencher.

3. The body obtains water in other ways than by drinking. Most foods contain a good deal of water. There is water in milk, bread and meat. Some foods, such as jelly, are almost wholly made up of water, and there is a great deal in all fruits and vegetables. But the water contained in food is not enough to keep us healthy, we must drink also. We must be sure that the water we drink is pure, because impure water is very dangerous and may carry the seeds or germs of disease.

4. Water is necessary to help to dissolve and make liquid the food which we eat, so that the body is able to make use of it. The part of the food which is nourishing is then in a condition in which it can be taken up by the blood and so carried to all parts of the body. Unless the food is in this liquid form it cannot be taken up by the blood, so that without water it would be of little use to us. We know that alcohol does not dissolve food, but makes it tough and hard and useless for the purpose of nourishing the body.

5. Take two test tubes and into one put some water and into the other some alcohol. Place a piece of bread in each and note the result. In the water it will gradually dissolve, but in the alcohol it will remain as long as you like to keep it. Try the same experiment with sugar, which melts easily in water but not at all in pure alcohol.

6. Water is also useful, because it helps to keep the body clean, not only outside but also inside. It dissolves the used-up materials of the body and carries them away. In this way it removes waste matter from the tissues and washes them out. Thus water not only carries into the body those things that it requires for its life and health, but it also carries out those which have served their purpose and are not only no longer necessary but would be actually harmful if retained.

7. Water also helps to regulate the heat of the body by circulating through the different tissues and by the act of perspiration. When we perspire some of the water of the body passes off as vapour, and as this goes on the body is cooled, because as the water is changed into vapour heat is used up. In the same way, we can cool a room in very hot weather by sprinkling the floor with water. As it dries up or is changed into vapour the temperature is reduced. The more rapidly we perspire the less we feel the heat.

Water is the only drink provided by nature and is the only one which is essential to life.

LESSON VII.

FOOD AND ITS USES.

1. If you were asked why people take food you would naturally reply that the reason is because they feel hungry. But if you were asked why they feel hungry you might have some difficulty in giving a correct answer. It is necessary, therefore, to know something of food and its uses.

2. The cells of the cell kingdom are constantly at

work and are continually wearing away. When we do hard work they wear away faster than if we are at rest, and there is therefore extra waste. Hunger is the call of the body for more building material to replace that which has been worn away. This wearing away goes on from day to day, but we do not notice any change in the body because we are constantly replacing the loss. If, however, the loss goes on for some time without being replaced, as when people are ill or starved, then we see that the body becomes thin and wasted. In order that the body may remain the same size and weight we must take food regularly. Children and young persons also require food to make them grow bigger and heavier. The food which they take is turned into bone and muscle.

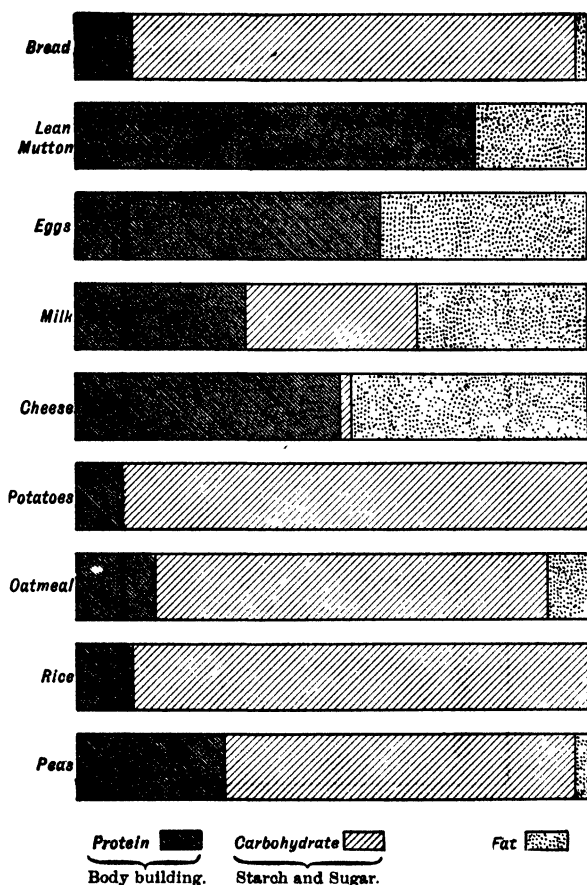
3. Food not only builds up the body and replaces waste, but it also produces heat and energy. When food is taken into the body it is burned up and heat is produced. The burning is not like that of a fire, but is a wet burning. When quicklime is thrown into water there is a great heat, and damp hay in a stack will become very hot. The burning of the food inside our bodies produces heat in something the same way. This heat is constantly being lost from the surface of the body, because the air and most of the objects which surround us are colder than the body, and it is therefore constantly being cooled down as the heat passes from it into its cooler surroundings. The heat lost in this way is replaced by the heat derived from food. This is why people are cold when they are hungry and why a good meal will warm a person on a cold day.

4. Food also gives us energy for work whether with body or brain. When a person has worked for some

time without food he begins to feel tired and loses his power and energy. Then what is required is rest and food to supply fresh strength and energy to make up for that which has been lost. It is very important to remember that food strengthens not only the body but also the brain. If the body does not get sufficient food it becomes weak and unable to work, and the brain also becomes less active. Children who are not properly fed cannot do their lessons so well. A child who goes to school without a good breakfast will not be able to do its school work properly because its brain will not be properly nourished. And if the brain is not well nourished when it is growing and developing the whole future life may suffer.

5. Thus we see that food builds up the body and helps it to grow ; that it produces heat and keeps the body warm, and that it is from food that we get strength and energy to work, both with body and brain. Substances which do any of these things are foods. Some make it grow but do not keep it warm, while others produce heat but do not help growth. For this reason we take different foods and have three or four different kinds at each meal. Milk is almost the only food which contains everything needful for children.

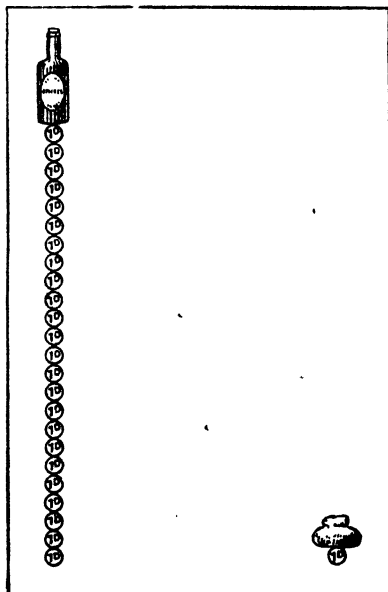
6. We all know the ordinary foods, such as meat, fish, bread, butter, cheese, sugar, potatoes and many others. Some people, however, through ignorance take other things as foods which are of no value. Many people think that such beverages as beer, stout, wine and spirits are foods. This is not so, because none of these beverages can keep the body from wearing away, nor help it to grow, nor produce heat or energy as real food can do. They cannot nourish the body, and they may do actual



SOME FOOD VALUES.

harm by preventing real food substances from being taken up by the blood so that the nourishing part of the food is not carried to the different parts of the body.

7. Many people say that beer is a food, and they drink it because they imagine it makes them more able to work. There is a little nourishment in beer. It contains a very little sugar and a very small quantity of the same food substance as is found in meat. But these quantities



2s. WORTH OF BEER IS WORTH LESS THAN 1d. WORTH OF BREAD.

are so small that to get enough to really nourish the body it would be necessary to drink a very large quantity. This would do far more harm than good to the body, because so large a quantity of beer would also contain a large amount of alcohol, which is a poison to the body. Any person who would be so foolish as to attempt to live on beer alone would become too weak to do any

work and would soon die. Moreover, it would be very foolish and wasteful to drink large quantities of beer as food, because the cost would be far greater than the cost of an equal amount of nourishment in the form of ordinary food. All alcoholic drinks are useless as foods for the same reasons. To speak of beer as liquid bread is both foolish and ignorant. A pennyworth of bread is of more value as food than two shillings' worth of beer.

8. Drinks containing alcohol have serious effects on the proper digestion of food. They irritate the stomach, and in this way disease may be set up. Pain and discomfort are caused, the appetite for good food is lost and less food is taken. When a person takes less food than the body requires, and when the food he does take is not properly digested, then the body soon begins to suffer from want of sufficient nourishment. Alcohol is not a substitute for food, and it interferes with the power of the body to make use of its ordinary food.

LESSON VIII.

THE BREATH OF LIFE.

1. Breathing is an action which we all perform without thinking. We breathe whether waking or sleeping, whether conscious or unconscious. No one is taught to breathe; the baby only a few hours old can breathe as easily as the oldest and wisest person in the world. There is a special machinery in the body which takes charge of the breathing, and this machinery, like all other parts of the body, is controlled by the brain. A person may live for several days without food or water,

but no one can live for more than a few minutes without air. Air is necessary for every living creature.

2. The air is round us everywhere. It stretches so far above us that, even in these days of flying machines, it is far beyond the greatest height to which any of them can go. We cannot see the air, but we can feel it when it blows against us, as on a stormy day, or if we lean out of a fast travelling train. Air is made up of several kinds of gases mixed up together. It is possible to take a bottle of air and separate it into its different gases and study each gas by itself. We are going to learn about two of them. One is the gas which keeps us alive, the other is the gas which causes death if we breathe air containing too much of it.

3. Everyone knows the difference between the air of a crowded city and the pure fresh air which we breathe at the seaside or in the country. Yet even in these places if people shut themselves up in a close room and keep the fresh air from getting in or, what is worse, the bad air from getting out, then the air will get worse and worse, and if people stay long enough in an atmosphere of this kind they will die. Some years ago a steamer sailed from Liverpool with 200 passengers. A storm came on and they were shut up in a cabin which was only eighteen feet long. They were crowded together in this narrow space, and before they were released nearly half of them were dead and many were so ill that they died shortly after.

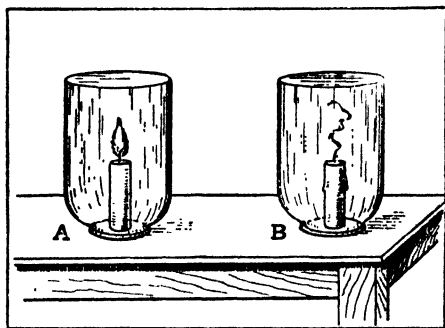
4. The gas in the air which keeps all men and animals alive is called oxygen. It is one of the most abundant substances in the world. In every hundred parts of air there are about twenty of oxygen. It is said to form one-third of the weight of the whole earth. It is oxygen

that makes the fire burn. When we blow the fire with bellows it means that we make the oxygen in the air pass through it more quickly, and the fire thus gets more oxygen and burns more rapidly and more brightly. If a piece of live coal is put into pure oxygen it will burst into a white heat and disappear in a minute or two. If an animal is put into a jar containing the pure gas it will jump about and behave in a very lively fashion. The air of the sea and country contains more oxygen than the air of towns, and this is why people who live in the purer air are happier and healthier.

5. As the fire requires oxygen to make it burn and will go out without it, so the human body requires oxygen in order to carry on its work and that it may be kept alive. How do we obtain this oxygen? We obtain it from the air. Every time we breathe we take in a quantity of this life-giving gas. It passes into our lungs, and there it comes in contact with the blood. The little waggon in the blood (corpuscles) take up the oxygen and convey it to every part of the body. The body cannot work or produce energy without a plentiful supply of this vital gas.

6. Take two glass jars or large bottles and dry them well. Place them upside down so that they are standing with their necks on the table. Inside one place a piece of cotton wool soaked in alcohol and lighted. Inside the other put a lighted candle. Both will soon go out. The reason is that in each bottle the oxygen in the air is soon used up and is replaced by another gas. If we lift the neck of each bottle and admit a little fresh air and again light the candle and the cotton wool they will again burn for a time, but will soon go out a second time. Now, if we put a little lime water into each jar

and shake it up it will turn milky white in colour. This is caused by another gas which is present in the jars. It is called Carbonic Acid Gas. It is a poisonous gas, and it is due to the presence of this gas, which has replaced the oxygen, that the flame goes out.



THE CANDLE GOES OUT BECAUSE THE OXYGEN IS REPLACED BY CARBONIC ACID GAS.

7. Take another jar or dish and put in it a quantity of lime water. With a pair of bellows or a bicycle pump blow some fresh air through it. You will see that it makes no difference in the colour of the lime water. Now take a glass tube and blow air out of your lungs through the lime water. At once it turns milky white just as it did when shaken up in the jar after the candle had been burned. This shows that the air breathed out of our lungs contains a quantity of this carbonic acid

8. Pure air only contains about four parts of this gas in 10,000. Air breathed out of the lungs contains between 400 and 500 parts. The more carbonic acid gas there is in air the more poisonous it is. In the manufacture of alcoholic drinks the sugar, either of the fruits such as

grapes or apples, or the sugar made from the starch in grains such as barley or oats, undergoes a process known as fermentation. It changes or is split up into two other substances : alcohol and carbonic acid gas. In this way much valuable sugar is wasted, and instead of a useful and necessary food we get two poisons. This gas often accumulates about old vats and breweries, and sometimes workmen are poisoned by the fumes which have gathered in these places. Often, in order to see if the air is safe to breathe, they perform the experiment with the candle. They let down a lighted candle on a piece of string, and if it goes out they know that the air is dangerous to life.

9. There is no more dangerous atmosphere than the air of a public-house. It is generally full of this deadly gas, of the vapour of alcohol, and of the germs of disease. Men who live and work in these places are always unhealthy and the death-rate among them is very high, that is, far more of them die than men in other occupations who are constantly breathing better air.

PART II.

THE EFFECTS OF ALCOHOL ON BODY AND BRAIN.

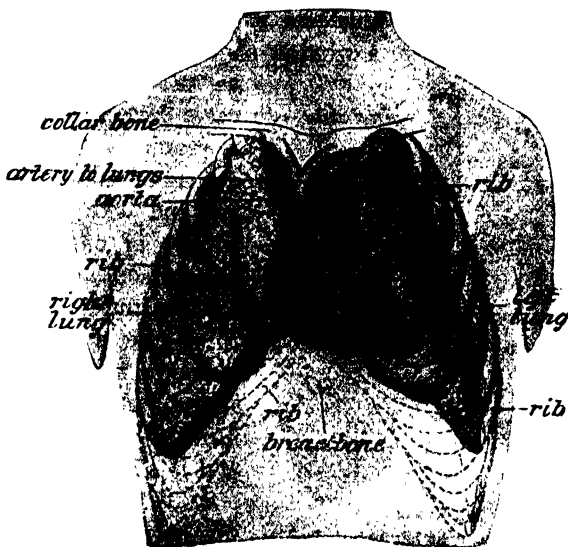
LESSON IX.

HOW THE BLOOD IS KEPT PURE.

1. The lungs are the magazines of the air, the ventilators of the whole body. Every time we take a breath the air is drawn into our lungs in order to supply the blood with the oxygen which it needs. At the same time as the blood takes in this oxygen it gives off the waste material and the carbonic acid gas. If we could not get rid of this gas by means of the lungs we would die in a few minutes. When a man is drowned or suffocated he dies because he is poisoned by this gas, which is kept in the blood instead of being allowed to escape by the lungs.

2. If we look at a piece of an animal's lung under the microscope we will see that it is made up of a number of little sacs or pouches. These are called air-sacs, and each is made up of a membrane so fine that it is less than the five-thousandth part of an inch in thickness. Spread around each of these is a network of very fine blood-vessels. The arrangement is something like a toy balloon enclosed in netting. The little waggons (blood corpuscles) circulate in these vessels all through

the lungs and round the air-sacs. In these air-sacs the air is changed ; the poisonous gas passes out of the blood into them and so into the outside air, and the fresh oxygen gas is taken instead and is carried by the little

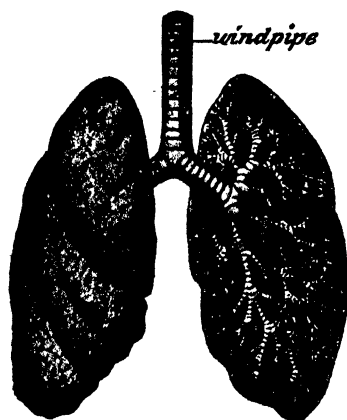


THE HEART AND LUNGS.

waggon to all parts of the body. Thus the blood is constantly being purified every time we breathe pure air.

3. Each time a person breathes out there passes into the air a quantity of the poisonous gas and moisture equal to about the size of an orange. As every person in ordinary health breathes about fifteen to seventeen times a minute it is easy to understand how much of this gas will gather in a room full of people if the doors

and windows are kept shut. In such a room people will soon begin to suffer from headaches and faintness. When this happens no alcohol should be given. Often it is the very worst and most dangerous thing which could be given. A person who faints should have the head kept as low as possible and should be taken into the fresh air at once, or a window should be opened as near



THE LUNGS.

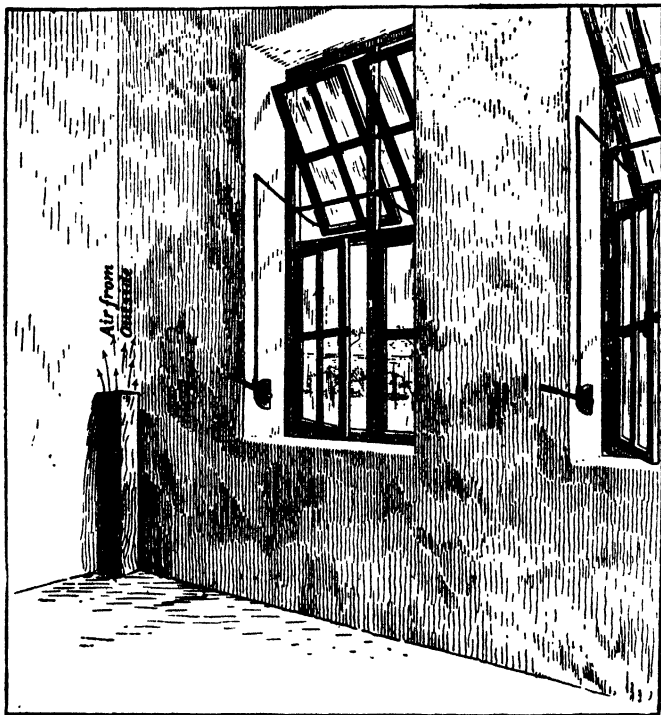
The lung on the right has been halved to show the air tubes.

as possible. In most cases fresh air is all that is required. The lungs get rid of the poisonous gas and take in a fresh supply of oxygen and the person recovers in a few minutes. If anything else is required a little hot water may be sipped. Alcohol in any form is not necessary and is often dangerous.

4. There are two places especially in which the supply of fresh air should be constant and abundant. One is the bedroom and the other is the schoolroom. Everyone should sleep with the bedroom windows open even if the weather is wet and cold. If they are shut, then the air of such a room soon becomes dangerous to health. In such air a person will sleep badly and probably wake up with a headache and tired feeling. It is in the air of such a room that the germs of disease, especially the terrible disease tuberculosis, grow and multiply. Moreover, the breathing and re-breathing of bad air lessens

the vitality of the body and makes it less able to resist disease.

5. If a schoolroom is badly ventilated the children are stupid and listless and not able to do their lessons



A HEALTHY SYSTEM OF VENTILATION.

well. The reason is that there is too much carbonic acid gas in their blood, and their lungs cannot get enough oxygen from the impure air to drive the poisonous gas out. What is wrong with such children is not that they are stupid or idle, but that their brains are slightly

poisoned and cannot work well. In every school open windows mean better lessons.

LESSON X.

HOW ALCOHOL ROBS THE CELLS OF OXYGEN.

1. If the finger is pricked with a needle the fluid which oozes out seems to be red. But if we examine



RED BLOOD CORPUSCLES OF MAN.
(Magnified 650 times.)

a drop under the microscope we find that it is really a very pale yellow and that it contains a number of very minute bodies. These are the blood corpuscles. Most of these are of a red colour and are the little waggons or red corpuscles. Others are colourless and are called white corpuscles. They have a special work of their own to do, as we shall learn later on. The red corpuscles are so small that ten millions of them might be placed on a square inch. They are very soft and elastic so that they can easily squeeze through narrow passages.

2. The millions of these little red cells in the blood carry the vital oxygen-gas to all parts of the body. They act simply as carriers and give up the oxygen to any substance that will take it from them. Alcohol robs these cells of their power to take up oxygen and to get rid of carbonic acid gas, and it does so in proportion to the amount of alcohol present in the blood. When alcohol is present in the proportion of ten parts in one hundred the power of the blood to take up oxygen is entirely lost. Thus the whole body suffers loss. This partly explains why young animals will not grow if given alcohol. Every tissue suffers if deprived of oxygen.



WHITE BLOOD CELLS.

a, a', b. Resting white blood cells.

c. White blood cells in the act of moving.

3. Thus we learn that even though we live as much as possible in the open air and keep all our doors and windows open we may still do ourselves harm by taking alcohol and so diminishing the amount of oxygen in the blood and increasing the amount of carbonic acid gas. **Anything that interferes with the power of the blood to take up the life-giving gas and to get rid of the poisonous gas is dangerous to health. Alcohol does this.**

4. If we place a drop of blood under a microscope and add a drop of alcohol we will see that the red corpuscles are affected in two ways: they lose their rounded shape, for alcohol absorbs the moisture from them and causes them to shrink, and they lose some of their matter and become paler. Alcohol also

breaks up some of the blood cells. Cells of every kind of tissue usually have the power to prevent the entrance within their walls of substances that will injure them. This is not the case with alcohol and other poisons of the same class, which easily pass through the walls and poison the cell substance.

5. When a man takes alcohol the body tries to get rid of the poison in various ways, and first of all by the lungs. The lungs try to get rid of it just as they throw off the poisonous carbonic acid gas. This is why the breath of the drinker smells of alcohol. A man may be able to walk quite straight and talk quite sensibly. He may have taken so little alcohol that no one would notice it unless very close to him. But we know that when alcohol is taken into the stomach it is absorbed into the blood, and as the blood passes through the lungs it gives off alcohol in the form of vapour and this vapour passes out with the breath.

6. The person who drinks alcohol frequently irritates and inflames his throat and air passages. Such a person often has a constant cough and husky voice and speaks in a hoarse manner. The lungs of a drinker are often congested and he suffers from shortness of breath. Besides consumption, drinkers are very liable to other diseases of the lungs, especially a very deadly disease called pneumonia, which is always much more dangerous in a man who drinks than in one who does not.

7. When alcohol circulates in the blood all the processes by which the body is nourished and built up are checked. Less oxygen goes to the various cells all over the body and less waste material is thrown out. The throwing out of this waste material is just like clearing the ashes out of a fire. The ashes must be

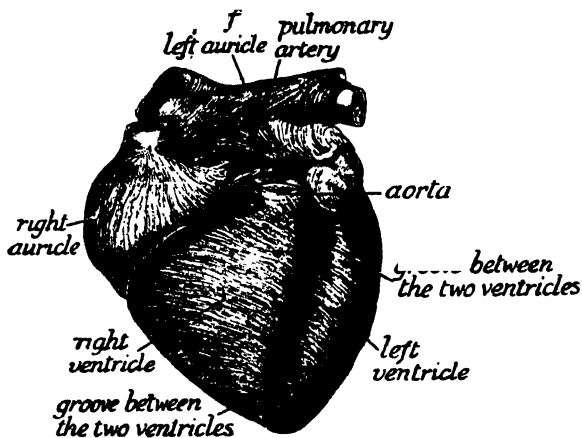
got rid of to allow a fresh supply of oxygen to enter so that heat may be produced. In the human body it is the same, and if these processes of nature are interfered with we cannot have perfect health.

LESSON XI.

HOW ALCOHOL MAKES THE HEART TIRED.

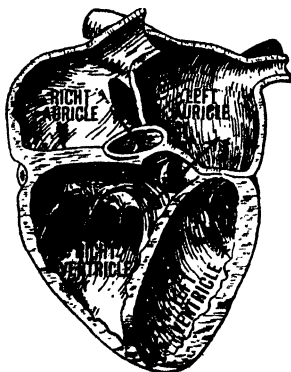
1. When the hand is placed on the chest on the left side we feel the beating of the heart. In some persons this beating may even be seen. When we place a finger on the wrist we feel a smaller beat which we call a "pulse," and if we put the finger on the side of the neck, in front of the ear, on the temple, or on the inside of the ankle, in all these places we will feel a similar beat which we also call a pulse. If the beat of the heart and the beat of the pulse are counted at the same time it will be found that they go together stroke by stroke, and the reason of this is that the beat of the pulse is caused by the blood being driven by the heart through the blood-vessels called arteries. Each time the heart beats the arteries are filled with blood, which is thus pumped all over the body. The arteries are elastic tubes, and each time the blood is forced into them they stretch, and the impulse felt in an artery is called the pulse.

2. The heart is the central organ of the circulation. It is a powerful hollow muscle which never rests, but goes on working day and night from the minute we are born till the minute we die. In every healthy person the heart beats about seventy-three times a minute. It beats a little more slowly when we are resting so that



THE HEART.

the total number of beats every twenty-four hours is about 100,000. The blood thus sent into the arteries carries the vital part of the air which it absorbs as it



SECTION THROUGH THE HEART.

passes through the lungs and it also conveys the nourishing material which it receives from the food, to all parts of the body. The blood returns again through the veins, full of impure gas and waste material. It passes again through the lungs, where it is purified afresh. It then returns to the heart and again commences its journey through the body. This goes

on continually, and thus the body is constantly kept nourished. The health of the body depends on the

condition of the heart and blood-vessels. If they are not in good condition and unable to work properly then ill-health and disease will result.

3. We know that when alcohol is drunk it goes through the coats of the stomach and passes into the blood. When this alcohol in the blood reaches the heart it paralyses the nerves which control it, so that the heart beats faster, just as a clock goes faster and the hands fly round when the controlling pendulum is taken away. Thus the heart has to do extra work and soon becomes fatigued. It is also weakened by the direct effect of the alcohol on the heart muscle and on the nerves going to the heart itself. Alcohol, therefore, reduces the working power of the heart by exhausting and weakening it.

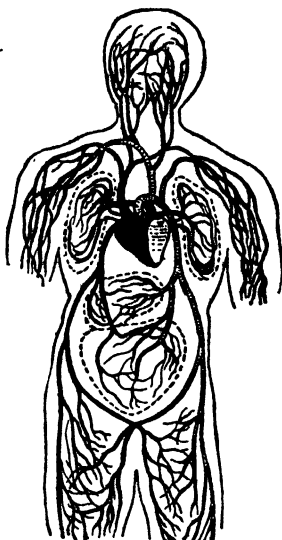


DIAGRAM OF THE CIRCULATION OF THE BLOOD.

4. It has been calculated that if a man takes six ounces of alcohol in the twenty-four hours his heart will beat 720 times an hour more than if he had only taken water, that is, 12 per minute beyond the natural number.* This extra work soon makes the heart tired, and, combined with the effect of the alcohol on the heart muscle and nerves, renders it unable to resist any extra strain or attack of disease. **If alcohol is taken continually the heart gradually becomes weak and flabby, and**

* Sir Benjamin Ward Richardson.

the heart muscle becomes stretched. Thus the whole circulation becomes weakened and the heart becomes diseased.

5. Another effect is the thickening of the blood-vessels. Little by little they become less elastic and their walls become thickened. Under the influence of repeated doses of alcohol they become rigid and brittle. They are like a piece of rubber tubing which has been allowed to become hard, and in this condition cracks when any attempt is made to stretch it. The healthy artery is like the fresh piece of tubing which stretches easily in all directions. These diseased blood-vessels often break under a strain which would not affect healthy vessels. A person may become unconscious as the result of one giving way in the brain or may die suddenly when one of the arteries in the heart itself gives way.

LESSON XII.

HOW ALCOHOL MAKES THE BODY COLDER.

1. Many people take alcoholic beverages to "keep the cold out," as they say. To use this phrase shows ignorance, for our bodies are not kept warm by keeping the cold out but by keeping the heat in. When we touch anything and say it is cold we mean simply that it possesses less heat than our body and that a certain amount of the body heat passes into it. We know that when food is taken into the body heat is produced, and as our bodies are warmer than the air and most surrounding things they are constantly cooling down and losing this heat. In winter when the heat is more rapidly lost we wear warmer clothing, such as woollen garments, to keep the heat in. When the cosy is put on the tea-

pot or the extra blanket on the bed, it is not to keep the cold out but to keep the heat in. In the same way, warm clothing prevents the escape of heat from the body. The clothing itself is warmed by the body.

2. Heat escapes from the body by the skin. In the skin are thousands of very small blood-vessels which can alter in size either by contracting or dilating like small elastic tubes. On a warm day they dilate or stretch, a large amount of blood comes to the surface and heat is given off. Thus the body is made cooler. On a cold day the opposite happens, the blood-vessels contract and become smaller and the heat is retained in the body. The important thing is, therefore, to keep the heat in. Anything that prevents this helps to make the body colder.

3. It is a strange thing that many people believe that drinks containing alcohol cause the body to become warmer. There is an explanation of this, and it is a very interesting one, for it illustrates very strikingly the deceptive power of alcohol. We know that when a person has taken any alcoholic beverage one of the first things that happens is that the face becomes red and flushed. The alcohol causes the small blood-vessels on the surface of the body to become dilated so that more blood flows into them. This causes a feeling of increased warmth. But there is no real increase of warmth, it is only a feeling, and even this is only temporary, it soon passes away and the person feels cold and chilly because the heat which is constantly being lost from the surface of the body is more quickly lost when the skin is in this hot and flushed condition. Alcohol, therefore, so far from keeping the heat in, actually brings about a waste and loss of the body heat,

and so makes the body colder than it would otherwise have been. Moreover, it cannot replace this lost heat as it is not a real food. It should never be taken on a cold day to make a person warm, as it will have the opposite effect. Instead of keeping the cold out it will let the heat out and may lead to a severe chill or even to something more dangerous.



CAPTAIN SCOTT'S EXPEDITION ON THE WAY TO THE SOUTH POLE.

4. If alcoholic beverages were of any value in helping to keep the body warm we would expect to find that they were very useful in cold countries. Yet in these places we find that it is very dangerous to use them at all. In cold climates, such as the Arctic and Antarctic regions, the taking of alcoholic beverages causes so much heat to be lost from the body that there may be severe suffering and even death from the cold. Arctic explorers have forbidden the use of alcohol by members of their expeditions because it causes this loss of heat

which is especially serious in such cold climates and also because it diminishes strength and power of endurance. Even in this country people who take alcoholic beverages and are exposed to severe cold are often frozen to death.

5. If alcohol is taken for a long period the small blood-vessels of the skin, being constantly stretched and dilated, remain in this condition. Thus the habitual drinker has a red face and nose, the eyes are blood-shot, and the whole appearance is heavy and stupid.

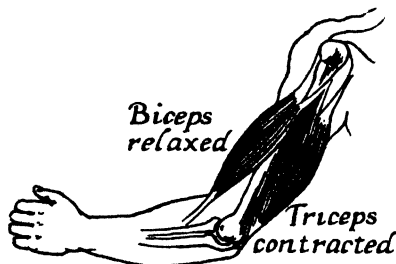
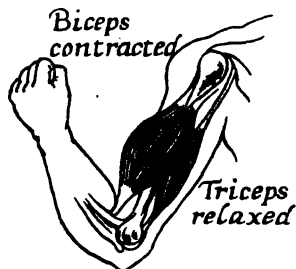
6. Take two pieces of blotting-paper and dip one in water and the other in alcohol. Place one on each wrist and cover with something to prevent evaporation, such as a watch-glass or egg-cup or large thimble. Leave for a few minutes and then note that the wrist covered by the one dipped in alcohol is redder than the other ; this is due to the blood-vessels being dilated.

LESSON XIII.

HOW ALCOHOL AFFECTS THE STRENGTH AND POWER TO WORK.

1. We have already learnt that the heart is a muscle and that it is made tired by alcohol. The same is true of all our muscles. What we call muscles are those masses of flesh by which we are able to move and work. They cover the bones and trunk of the body underneath the skin. By them the body and limbs are moved. They form nearly half the weight of the body and give to it its outline and form. Each muscle has the power of shortening itself or contracting. While it becomes shorter in length at the same time it becomes thicker, and thus the parts to which each end of the muscle is

attached are brought together. If you grasp the front part of your arm above the elbow when the arm is straight out and then bend it at the elbow you will feel the muscle becoming shorter and broader and forming a firm hard lump under the skin. The muscle has contracted and has lifted the hand and arm upwards.



MUSCLES WHICH MOVE THE FOREARM UP AND DOWN.

2. Each muscle contracts because a message is sent to it from the brain by a nerve which passes into the muscle substance. Some of the muscles we can move of our own free will, as the muscles of the arm and leg. Others are moved from the brain without our will, as the heart muscle. The cells of the brain rule all

other cells, and sometimes they exercise their power while we are unconscious that they are doing so.

3. If a man is going to perform some task requiring skill and endurance and takes alcohol, either before or during his work, he will not do it so well as if he had taken no alcohol. The brain messages which pass along the nerves to the muscles are interfered with; they are slower and less regular. The drinking of alcoholic beverages weakens the heart

muscle and the muscles of the body generally, and so lessens the strength and power to work. All men who have hard work of a muscular kind to do can carry out their work much better if they avoid every drink containing alcohol. Strong drink is not the drink of the strong.

4. Many experiments have been made from time to time to show that this is true. A number of soldiers of the same age, living together and eating the same food, were divided into two gangs. They were given certain work to do and they were paid extra according to the amount of work they were able to accomplish. One gang were allowed to use alcohol in the form of beer whenever they felt tired. The others were not allowed any alcohol. Those who took the beer at first worked harder, but they soon became tired, and before the end of the day the others who had no beer had done far more work and had earned more pay. When this had gone on for some time the men in the first gang asked to be changed to the other in order that they might earn more money. The two gangs were now changed, those who had got beer now got none, while those who so far had worked without it were allowed to use it. The results were the same. The beer drinkers went ahead at first, but became soon tired, and at the end of the day were far behind.

5. On a great English railway there was a gang of navvies who did more work in a day than any other gang on the line and always left off work an hour or an hour and a half earlier than any other men. None of this powerful gang of workers took alcohol in any form. Another railway had to make alterations in the lines along 200 miles and the work had to be done in two

days. Five thousand workmen were employed, no alcohol was permitted, and the work was done in thirty-one hours. During the construction of the Panama Canal, connecting the Atlantic with the Pacific Ocean, fifty thousand workmen were employed for several



PANAMA CANAL.

years. During that time alcohol was entirely forbidden over an area of five miles on either side of the canal. Thus one of the greatest engineering feats in the history of the world was completed without alcohol.

6. Those engaged in athletic contests and exercises all testify that if excellence is to be attained and maintained alcohol must not be taken. Twelve hundred alpine mountain-climbers, who were examined on this point, agreed that, so long as prolonged effort is required

and difficulties are to be expected, no alcohol should be used. Many trained sportsmen, runners, rowers, swimmers, cyclists, cricketers and football players have given the same testimony. The men who perform great feats of strength and endurance, the athletic champions of the world, agree that alcohol in any form is a hindrance and not a help.

7. Generals in all armies tell us that the soldier who avoids alcohol is altogether the better man. He can do more work, can march better and is a better soldier all round. In the South African War it was observed that the soldiers who drank alcohol were the first to fall out on a long march and were less fit in every respect than those who took none. In all the armies engaged in the great European War the same has been found to be true. The soldiers who do not drink are fitter both in body and mind, they can march farther, they suffer less from exhaustion, and even when the strongest among them become tired they recover from the exhaustion much more rapidly.

8. We can easily understand why this should be so when we know the effect which alcohol produces on the heart and muscles. It is clear that muscular fatigue, following severe exertion, is far less readily recovered from if alcohol is taken during the work or exertion. It gives no additional strength to the body, but is like the whip to the tired horse which really needs rest and food. Alcohol makes the body use its energy faster than it otherwise would and leaves it more tired than before. The general conclusion from all these facts is that men who have to do hard work will do it more easily, and will do it more thoroughly, in every way, without alcohol.

LESSON XIV

ALCOHOL THE ALLY OF DISEASE.

1. We have learnt that, in the cell kingdom, the health of the cells depends on the condition of the living matter of which they consist. If one set of cells is injured or poisoned then the whole cell kingdom suffers. Just as our country has enemies who attack it, so the cell kingdom has enemies who continually attack it from all sides. In order to defend our country we have an army of soldiers, and in the same way the cell kingdom has a defending army which fights for it and protects it against its foes.

2. What are the enemies of the body ? They are all around us though we cannot see them. Did you ever think that there are really more things in the world that we cannot see than all the things we can see ? The simplest kinds of living creatures that live all around us are so small that they are quite invisible. They are called microbes, a word meaning very minute or tiny life. Sometimes they are called germs, meaning little buds, but they are more like seeds than buds. Some are helpful and do good, but many are very dangerous, because they cause sickness and disease. Many of them when they enter the body produce poisons in the blood and the effects of these poisons are what we call the symptoms of disease.

3. These germs can grow very fast. As many will grow from one in a few hours as there are people in the whole world. And from each of these as many more will grow, so that the numbers would be so enormous that the cleverest brain in the world could not grasp

them. These germs or seeds of disease grow in all places where there is dirt or darkness or bad air. The air of public-houses is full of them. The enemies of these deadly germs are, on the other hand, fresh air, sunshine, cleanliness, good food, and abstinence from things which harm the body. The army of the microbes is large and powerful, but it cannot fight against light and purity. **One of their most powerful allies is alcohol.**

4. Where are these microbes or germs of disease found? They are everywhere; in air, in food, in water, in our bodies and the bodies of animals, in houses, in the street and in the soil, and especially in all kinds of dust. There are very few in the air on the tops of high mountains or out at sea, because the air is so pure in these places that they cannot exist, but they are found everywhere else. They are constantly all round us, and if there were not some way in which we are protected against them very few of us would remain alive, for they would slay millions of human beings in a short time.

How does the body protect itself against these deadly enemies? The explanation of this is one of the most wonderful stories ever told, it is a real fairy tale of science.

5. We have learnt about the blood and the bodies it contains, called corpuscles. There are red cells and white cells, but there is only about one white corpuscle to every 400 red. If we magnify a white corpuscle and look closely at it, the first thing we notice is that it is very like an amoeba. It consists of a single cell which moves about and changes its shape. These white cells are the defensive army of the body against disease. Whenever any disease germs gain entrance into the body by the breath, or with the food, or by a

wound, or by any other way, the defending army of the white cells in the blood is ready for them. They rush to the spot in millions. More wonderful still, they call up millions of new recruits. Inside the body there are factories where these are manufactured. When the body is attacked by disease these work at their highest

speed and multiply their rate of production many times over.

6. How do the white cells destroy the disease germs? They eat them up. Just as the amoeba devours a particle of food, so a white cell eats up a microbe. It throws itself around it, captures it and devours it. If you



WHITE BLOOD CORPUSCLES DESTROYING DISEASE GERMS.

looked at a drop of poisoned blood under a microscope you would see the white cells eating up the disease germs. Many of the body soldiers are killed in the fight, just as real soldiers are killed on the battlefield. When the white "matter" in a poisoned finger is let out it consists of the dead bodies of these little white soldiers.

7. Often the invading army has allies that fight along with it. Bad air, cold, damp, fatigue, too little food, all help the enemies of the body to gain the victory. But one of the greatest allies is alcohol. When there is any alcohol in the blood the soldiers of the body are not able to fight. They cease to move and are sluggish. Instead of rushing to devour the microbes they remain

quiet and motionless and seem to be paralysed. Also, people who drink alcohol have a smaller number in their blood than those who take none.

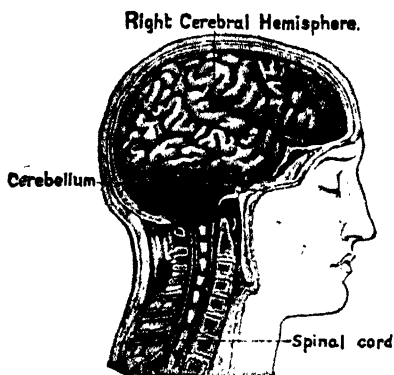
8. Suppose an enemy invaded our country and we sent out our army to defend us, what would we think if our soldiers were all made stupid or put to sleep so that when the enemy advanced they were not able to move against them? **That is what alcohol does to the body. It paralyses and stupefies the soldiers that protect it against disease.** This explains why a person who takes beer, wine, or spirits is more likely to become ill and less likely to recover than one who does not. It also explains why, in such persons, wounds, sores and cuts heal far less readily and why they are more likely to suffer from blood poisoning. They have to fight against two enemies at the same time—the attacking army of disease germs and their ally alcohol.

9. It may make all the difference between life and death to us whether our army corps, the white corpuscles, are able to fight well or not. It is strange that the defenders of the body can fight and destroy the germs of the most deadly diseases but they cannot fight against alcohol. Such a small quantity of alcohol as a moderate drinker might consider quite safe may not rob the defending cells of all power. They may be able to get to the scene of battle, they may even attack the microbes, but instead of being strong enough to conquer they are weak and easily overcome. The more alcohol any drink contains the more are the soldier cells weakened by it. **Alcohol is the ally of disease.**

LESSON XV.

THE MOST WONDERFUL THING IN THE WORLD.

1. If you were asked what was, in your opinion, the most wonderful thing in the world you might have some difficulty in making up your mind, especially at the present time. There are so many marvels all



THE RIGHT HALF OF THE BRAIN AND THE SMALL BRAIN (CEREBELLUM).

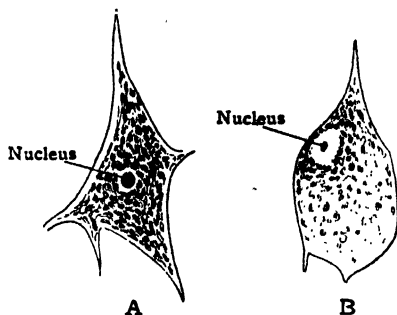
around us, and each one seems more wonderful than those which preceded it. The aeroplane, the submarine, the cinematograph, the wireless telegraph, all these excite our wonder and amazement. But there is something still more wonderful than all these things, and that is

the human brain which conceives them and without which none of them would be possible.

2. We have learnt that the finest and most delicate cells of the cell kingdom perform the work of guiding and controlling and ruling over all the others. These are the cells of the brain. All the cells of the body are subject to the great central seat of government in the brain, which in this way is the supreme ruler of the cell kingdom. All the powers of both body and mind depend on its health and activity. It controls all movements, it sends its orders to over five hundred

muscles. It receives messages from the organs of sense ; we see, hear, smell, taste and feel because messages are sent to the brain from the eye, ear, nose, tongue, and from all over the surface of the body. Thus, when we see a fast motor car coming, a message passes to the brain from the eye and another is at once sent out to the muscles to enable us to move quickly into a place of safety.

3. These messages are carried by the nerves. The brain itself is like a great telegraph or telephone exchange, and the nerves are like the wires which carry messages both backward and forward. The nerve cells are like the electric cells



BRAIN CELLS.

A. Normal cell. B. Degenerated cell.

which send out the current. But if all the telegraph and telephone systems in the whole country were put together they would be very simple compared with the human brain, with its three thousand millions of cells and as many nerve fibres connecting them together, so that the messages can pass in all directions.

Each cell can not only send out and receive messages but it can keep itself in working order. Yet they are the most delicate cells in the body and are the most easily injured.

4. If we look at a brain cell under the microscope we see that it has a distinct resemblance to an amoeba or a white blood corpuscle. It is constructed on the same

plan and of the same material. Of course it does not move about or change its shape, but it is composed of the same living matter. It is a cell of the same kind only finer, more delicate and more highly developed. There is a vast difference between the humble little animal that lives in a single drop of water and the cell in the brain of a great genius, such as William Shakespeare or Isaac Newton, but the laws that govern the one are the laws that govern the other. One drop of alcohol in a thousand drops of water will injure the tiny amoeba cell, and the smallest drop of alcohol attacks and injures the delicate brain cell.

5. The brain is supplied with blood by numerous blood-vessels, because the delicate cells require to be perfectly nourished and all waste material must be quickly removed. The brain can only be nourished through the blood, and it is poisoned in the same way. When alcohol is taken it is rapidly carried to the delicate brain cells, it attacks them first and harms them most. The blood circulates round every cell and it carries the alcohol to every part of the brain. At first it seems to have a stimulating effect, because the blood-vessels in the brain are stretched or dilated in the same way as the blood-vessels in the skin, and more blood flows into them. But this soon passes off, just as the feeling of warmth passes away from the skin. The poison begins to affect the delicate cells and the brain becomes deadened. Feelings and sensations are blunted and the proper control of the brain over the muscles is weakened. In other words, **the messages sent out from and received by the brain cells are delayed and made uncertain by this powerful poison circulating in the blood.**

6. One of the most delicate pieces of machinery we

know is a watch. If a very small piece of dust gets into the works it may do a great deal of harm. The owner of the watch may know nothing about it till he finds his watch keeping wrong time and he misses a train or is late for some important engagement. We know that the cells of the brain are many million times more delicate than the works of the finest watch ever made. A little alcohol circulating in the blood will interfere with the work of these cells in somewhat the same way as the speck of dust in the watch. It may be a very

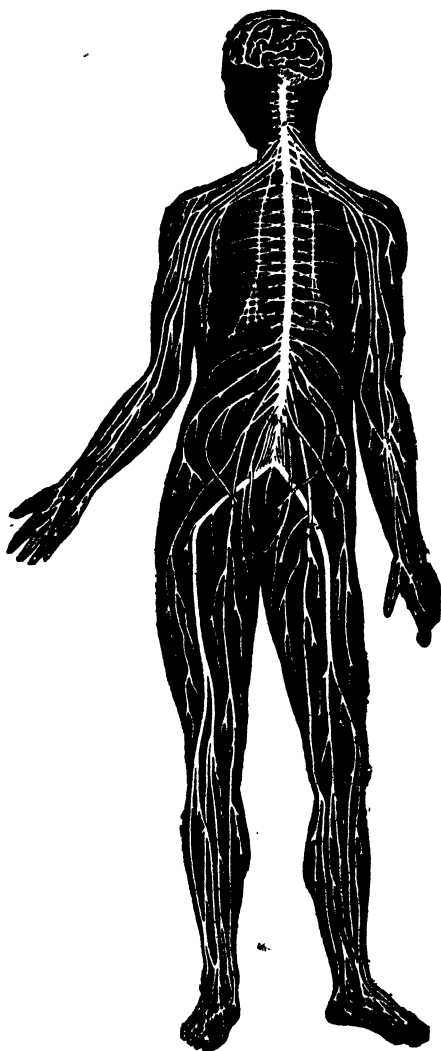


DIAGRAM OF THE NERVOUS SYSTEM.

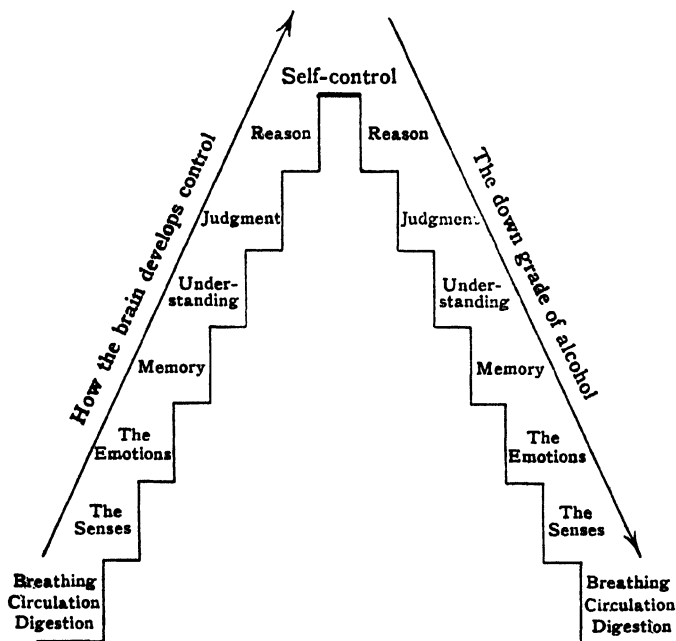
little alcohol, so little that neither the person who has taken it nor anyone else may notice any bad effect. Yet it makes the brain cells act more slowly ; the messages which pass back and forward are delayed. Thus, in the case of a person driving a motor car or working with machinery an accident may occur, and this is the real explanation of many of the accidents that occur frequently both in the factory and in the harvest field. A man who has taken only a moderate dose of alcohol is really a greater danger to himself and others than a man who has taken a great deal. No one would allow a man who is unable to speak properly or is staggering about to drive a motor car or to work with machinery. He is like a watch that has stopped altogether and is clearly useless. But the person with the small amount of alcohol in his brain is like the watch with the speck of dust in the works. It is depended on because it seems to be all right, and in the same way the man is trusted to perform some duty perhaps involving the safety of himself and others, and only when it is too late is the danger realised.

LESSON XVI.

THE GREAT POWER OF SELF-CONTROL.

1. The brain grows from birth till a person is about thirty years old. During all this time it is of the greatest importance that it should be well nourished and that it should be kept free from anything that would injure it. Alcohol is especially dangerous, and for this reason alone should never be given to children. There are many other reasons, but this is the most important. The cells in a child's brain are more simple and are not

so completely formed, and they are not connected with each other by fibres, so as to work together as in the brain of a grown-up person. As the child grows older the brain cells also grow and they become more closely



THE UP AND DOWN GRADE; HOW WE CLIMB AND HOW WE MAY FALL.

connected with each other, and thus the brain becomes the highest thing in nature and the most perfect and delicate in its working.

2. The brain not only grows but it develops, that is, it acquires new powers. A man may grow to be very big and strong, but if his brain does not develop he will still have the mind of a child. Sometimes the brain

never begins to grow in childhood, and a person possessed of such a brain is spoken of as simple-minded or not wise ; the mind has not grown with the body. In every healthy person, however, the brain both grows and develops, and it does so according to a regular plan, and **the powers which the mind develops appear in a definite order.** As we grow older we grow wiser, step by step we mount higher in mental power. Anything that interferes with this is a danger which may destroy the happiness and efficiency of our whole life.

3. If we look at a newly-born baby in its cradle we will notice that it just seems to be alive and no more. Its heart beats. it breathes and it takes its food. All its brain does is to control these simple functions, without which it could not live. After a few days the child begins to notice things, such as a bright light, and learns to know different sounds. Its senses are developing. After a time the child begins to show fear, anger, sorrow, joy and other emotions, its brain has developed a step further. Then it begins to remember things and people, the group of brain cells in which memory is stored are beginning to take up their work. Then the higher parts begin to develop, understanding, judgment, reason ; the child goes to school and begins to learn and to think for itself. **And last of all and highest and greatest of all, the power of self-control is acquired.**

4. How does a baby learn to walk ? First of all it has to learn to stand, which it does by holding on to its mother's hand or to a chair. Then it ventures a few steps, still holding on, and after a time it tries to go on by itself. Why cannot it stand and walk all at once ? It is not because there is anything wrong with the muscles of its legs, for it can crawl about or lie on its

back and kick. The reason it totters and falls at first is because it has not the power of control. The cells in its brain are not developed, and it is only when they develop that it acquires the power to control its muscles. When it is born the brain cells which control muscles are not ready for use. It is the same when a child is learning to talk. The lips and tongue are perfectly formed, but the child cannot control them to pronounce the words. Gradually and slowly it acquires this power.

5. Just as a child learns to control the muscles of its body so it gains the power of self-control in more important things. This is the last power it acquires and it is the greatest. Also it is the most difficult to learn. Animals have almost no self-control and savages have very little, the highest part of their brain is not so well developed. The power of self-control means the power to say, "No," the power not to yield to temptation, the power to control our thoughts, words and actions. Loss of this power is the sure sign of a weak mind and a weak character.

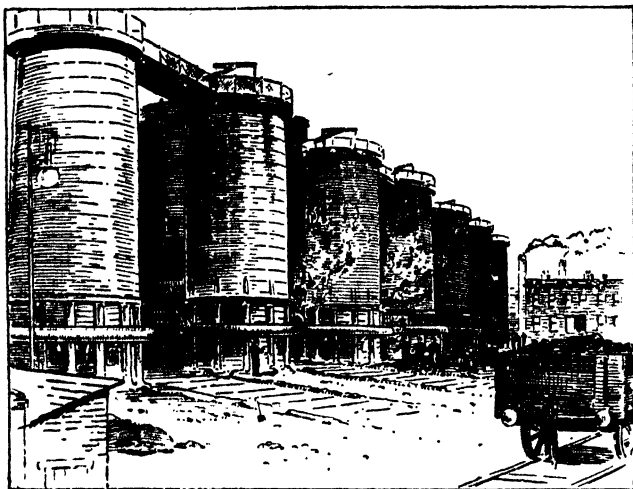
6. We know that **alcohol first attacks the highest part of the body, that is, the brain, but it goes further and attacks the highest part of the brain itself.** Alcohol begins at the top and works its way down. The first power of the brain it attacks is the highest, the power of self-control. This affects all the other lower levels, at first only slightly; but this may be a very serious matter, for it means that the reason, judgment and understanding are not under complete control. If still more alcohol is taken the result is still worse, and soon the memory and emotions are affected. The person forgets something important, or at a further stage he laughs or weeps or behaves himself in a foolish manner.

Then the loss of control goes further and he does not see properly, and begins to stagger about like the child learning to walk. Last of all, he comes down to the level where he is just alive and no more ; he is quite unconscious, but his heart and circulation still go on. Sometimes so much alcohol has been taken that even the brain cells controlling these vital functions are put out of action and the person dies.

7. When there is only slight loss of control of the higher centres no effects are generally apparent to the ordinary observer. A person in this condition seems to be able to speak and walk and act as usual. But he is unable either to reason or to judge correctly and is not fit to be in any position of responsibility. A knowledge of this fact gives us the true explanation of many serious accidents and disasters both on land and sea.

8. You will see that **alcohol reduces man from the highest to the lowest**. Even if it affects only one or two brain levels it is a danger. It causes loss of control of our thoughts, speech and actions, it makes people say foolish and wicked things and perform foolish and wicked actions. Everything we learn at home and in school and in church tends to make us wiser and better, and alcohol reverses all this. The man who takes alcohol loses his will power, he is no longer master of himself.

9. When alcohol is taken for a long period the brain cells may be destroyed altogether. The brain of a person whose cells have been destroyed in this manner has been compared to a box of jewels packed in wool in which all the jewels have disappeared and only the wool is left. The brain cells are the jewels of the body and we should avoid anything that would dim their lustre or dull their brightness.



IRON FOUNDRY.

PART III.

THE EFFECTS OF ALCOHOL ON THE INDIVIDUAL, THE FAMILY AND THE STATE.

LESSON XVII.

ALCOHOL AND EFFICIENCY.

1. We have considered the effects of alcohol on the body and mind, how it injures the whole kingdom of the cells, how it interferes with the work of the heart and lungs and lessens the power and capacity to work. Alcohol is injurious to all parts of the body. It is clear, therefore, that a person who takes alcohol regularly is less fit and healthy. Such a man will do less work and worse work. Neither his muscles nor his brain can do their work so well as those of a person who takes no

alcohol, and both the amount and the quality of his work will suffer in consequence.

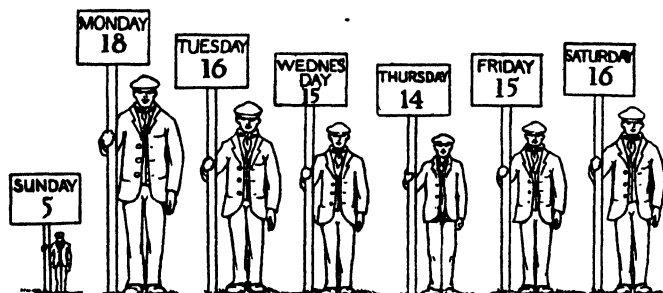
2. The clever workman who does skilled work suffers because he loses the steadiness and sureness of his hand. The labourer loses his strength, and all workers who drink are in danger of losing their regular and industrious habits. The worker who does not drink can develop his physical and mental powers to the highest degree and will remain longer in possession of them. He is better off, because he can do more work and earn more wages, and he is in good health and enjoys life better.

3. The man who habitually takes alcohol in any form, whether beer, wine or spirits, is, on the other hand, seldom in good health, because he spends his money in drink rather than in food. The lack of good and sufficient food, together with the alcohol which he drinks, causes him to feel ill and miserable, and he then drinks more alcohol and thus goes from bad to worse. All the drink he takes only makes him forget his troubles for a time, and when the effect passes off he feels more miserable than before.

4. Such a man often becomes idle and useless and he begins to neglect his work. Moreover, when he does work he feels tired and listless, and any work he does is usually bad. If he is in a situation he finds difficulty in keeping it, for his work is irregular, and if he is dismissed he develops into a casual labourer and lives as best he can on any odd work he is able to obtain. **Thus drink injures the worker by taking away his strength and lowering his wage value.**

5. A man who does not drink will do better work and will have the advantage over the drinker, because he will obtain regular employment, he will earn higher

wages, and he will be able to keep his situation. He will be depended on, and will have a better chance of promotion to a higher post where he will get higher pay. We have therefore a clear contrast between sobriety and intemperance in regard to labour. Sobriety is an aid to efficient and productive labour and helps to produce and maintain good wages, because both the quality and value of the work done is high. Intemperance, on the other hand, produces work of low



AVERAGE ACCIDENTS DAILY IN FACTORIES IN SWITZERLAND.
Observe the large number on Monday following week-end drinking.

quality and value, for which low wages are paid. In this way drink is an economic loss.

6. If a man wishes to start in any business or profession he must have a sum of money or a quantity of machinery, or some land or property. This is called his capital. Capital may also take the form of experience, of learning, or of some special knowledge or accomplishment. It is a very serious thing when capital is lost or diminished. **The working man's capital is health, not wealth.** He depends on his strength and skill. Anything that destroys these strikes at the very foundation on which his prosperity is built.

7. Thus we see that alcohol affects unfavourably all the physical and mental operations most essential to the efficiency of the worker. In these days of complicated machinery and intricate processes this is an especial danger. A modern worker requires speed, physical and mental alertness, attention and endurance. Alcohol slows the speed of messages from the brain to the muscles, causes dulness of perception instead of alertness, decreases the power of attention and lessens endurance. For these reasons it is **the enemy of the worker.**

LESSON XVIII.

ALCOHOL AND CHARACTER.

1. We have learnt that the most serious of all the effects of alcohol is its power to lessen self-control. The power of self-control may be lost even although the quantities taken are never large enough to produce what is called drunkenness. Each time a man takes alcohol his power to resist the temptation becomes weaker and he yields to it even although he knows that he is doing wrong and fully understands the harm that his weakness causes. The longer the habit continues the harder it is to give it up. Thus a man gradually loses his character by losing his self-control.

2. When we speak of temperance and self-control we must understand clearly what we mean by these. Many people confuse temperance with total abstinence from alcohol, but this is wrong. Total abstinence is only one form of temperance. But it is impossible to have perfect temperance or self-control if alcoholic liquors are used, because alcohol, by its action on the brain, renders self-

control more difficult in proportion to the amount and intensity of its influence.* It is thus one of the chief causes of intemperance or loss of control, in whatever form this may be manifested.

3. We use the power of self-control when we make ourselves think, say and do what we know to be right, when we do not give way to bad temper, and when we try to avoid greed, laziness, selfishness or unkindness to others. When a person is intemperate in one way he is likely to be intemperate in others also, and if self-control is lost in one way it often means that there is weakness of character in other directions as well. Thus alcohol, by its deadening action on the brain, makes men less able to control their thoughts, words and actions, and so leads them more easily into yielding to temptation. It deprives them of their strength of will and character and so they lose the power to choose aright.

4. When a man becomes unfit for his work and is in ill-health owing to indulgence in alcohol, he becomes careless in his work and neglects his duty. This may have serious consequences to himself and others. Many great railway and steamboat accidents have been traced to the confused brain of persons in responsible positions who have taken alcohol. A signalman may forget to alter the signals or a sailor may steer his ship in a wrong direction. In factories where explosives are made a very little carelessness or neglect may lead to frightful disaster.

5. Another result of taking alcoholic liquors is the formation of evil habits and the loss of self-respect. A drinker becomes careless about his personal appearance and ceases to take a proper pride in being clean,

* Dr. J. J. Ridge.

smart and neat. This leads to further moral degradation. He ceases to be truthful and industrious and he may become actually dishonest. Men often begin to steal in order to obtain money to purchase alcohol. At first the sums of money may be small or the articles of little value, but they generally become larger, and the person may at last commit some serious crime and find himself in prison. Often a man will take alcohol in order to give himself the courage to commit some crime he would not commit if sober. This is not real courage, **the alcohol deadens the higher parts of the brain, so that the person is not able to judge properly of the risk and danger he is running.** Thus alcohol leads step by step from neglect of duty to evil habits, moral degradation and crime.

6. Alcohol silences the voice of conscience and weakens the power of distinguishing between right and wrong. A man who drinks becomes a slave to his passions, and becomes easily irritated and quarrelsome. In this condition he may commit some frightful deed without knowing what he is doing, and of which, when he becomes sober, he may have no recollection. Nevertheless, he has to suffer the penalty, for the fact that a man was intoxicated at the time when he committed the act is not taken as an excuse. The greater number of those who spend their lives in prisons are there because they are alcohol takers. Their brains are poisoned and their power of control is lost.

LESSON XIX.

ALCOHOL AND THE FAMILY : THE HOME WITHOUT ALCOHOL.

1. A man who does not drink is not only happier and healthier himself and able to earn more money, but his home and family are also benefited. The home of such a man is orderly and well conducted. It is well furnished and has an air of comfort and prosperity. Both the worker and his family are comfortable and contented and he is a valuable citizen of the State. He saves his money, and what he spends he spends wisely and does not waste it in useless ways. Such a man practises thrift.

2. **Thrift means a state of thriving.** We can all understand what this means. When we say that a plant or animal is thriving we mean that it is growing and developing. If it is not doing this there is something wrong. Persons and families that practise thrift are in a state of thriving. Thrift is generally applied to saving money, and in order to save money we must exercise care in spending it. Thrift is the opposite of waste, and just as alcohol is the chief cause of waste, so it is the chief enemy of thrift. The man who does not waste his money on alcohol saves a good sum by the end of the year. He can put his money in the bank so that it may be useful to him on some future occasion when he may need it specially, or he may spend it wisely in food or clothing. In this way he benefits by his thrift and is better off and his family shares these benefits along with him.

3. Everyone should practise thrift, both children and grown-up people. This does not mean that they should

be mean or greedy or selfish. There is a great difference between greed and selfishness and true thrift. No one should waste either money or anything else. It is the duty of everyone to practise thrift and to try to get others to practise it also.

4. In the home of the sober man the children are well cared for. They have plenty of suitable food to build up their bodies and to give them energy for their work and play. They are well clothed, and thus in cold weather their bodies are kept warm, and they are therefore able to resist cold and damp, and in this way they escape when attacked by the germs of disease. The children of a sober man are generally better educated. If they wish to learn anything for which a special training is necessary they can get this, and thus they are able to get into good situations and to be happy and successful in their after life. They learn to be thrifty and careful and to avoid the waste and danger caused by alcohol, and like their parents they also become valuable citizens.

5. If the sober man should by some misfortune, for which he has no responsibility, lose his employment for a time or suffer from some unavoidable accident which lays him aside, then he is able to meet his ill-fortune with the resources supplied by his thrifty and careful habits. He can use the money that he has saved to tide over the time of difficulty. Often such a man belongs to a "society" of those like himself who are careful to provide for times of difficulty. They pay so much a week or a month, and in sickness or other difficulty they receive a regular sum during the time when they are unable to work. All young persons when they are old enough to be admitted should join one of the "societies" by which people are able to help each other

during temporary hardship or misfortune. In many cases a sum of money is laid by for old age, or in some cases an arrangement is made by which a man is able to purchase his own house. All these benefits are more commonly enjoyed by those who do not waste their money on alcohol.

6. Home is the place where men and women are trained and the nation is moulded. **A home which is prosperous and comfortable produces good citizens.** Those who possess such homes value them above everything on earth ; when they have to leave them they do so with sorrow and regret and they look forward eagerly to their return. When they grow up and have homes of their own they try to model these on that in which they were brought up. Every home like this forms part of the national wealth.

LESSON XX.

ALCOHOL AND THE FAMILY : THE HOME WITH ALCOHOL.

1. It is clear from what we have already learnt that if a man is so foolish or so ignorant as to waste his money on alcohol he does not injure himself only, but also all those who belong to him or depend on him in any way. **Alcohol is the enemy of the family.** It destroys comfort, that is to say, it alters the condition of affairs which permits a family to provide for all its daily needs : food, clothing, lodging, fire, light, etc. Unless a worker spends sufficient of his wages on each of these necessities of life, his wife and children have to go without them or fall into debt or seek assistance from charity. Moreover, the man who wastes his money

on alcohol is unable to make any provision for the future. He does not save anything, he puts no money in the bank, he does not join his sober and thrifty fellow-workers in a "society" for mutual help. Thus when he is out of work, or the victim of sickness or accident, he is unable to do anything to meet his difficulties.

2. The money that he wastes on alcohol is lost, because he gets no proper return for it. At the end of each year he is poorer by the amount he has spent, without any increase in health, strength or comfort. On the contrary, he is probably worse off in all these particulars. He may not be a drunkard or even a regular drinker. But even if he spends a small part of his money on drink he will have to spend less on something else. He will buy less food or clothing, and thus his family will be under-nourished and insufficiently clothed.

3. The habits of a drinker affect his wife and children. The home is wretched and unhappy. There is not sufficient money to buy food and clothes or other things which produce comfort and increase the pleasure of life. Those who suffer most are the wife and children, and they often have a miserable and unhappy life. Sometimes both parents are drinkers, and then the children are neglected, and in many cases even treated with cruelty. They have no chance of making a good start in life. They are not properly fed, and their health and energy are below the average. They do not grow in the same way as children who are properly fed and carefully looked after, and they cannot learn their lessons so well as their brains are not properly nourished. Such children become accustomed to poverty and discomfort and they grow up without any desire to do

any better themselves. Often, indeed, they learn to drink while quite young. Thus they are injured from the start in both body and mind, and their chances of leading happy and useful lives are greatly lessened.

5. **Alcohol destroys the whole family life.** Affection and respect for each other disappear. There are quarrels, threats, often blows. The children have a bad example always before them, they lose respect for their parents' authority and refuse to obey them. The parents waste their money, become cruel and neglect the children and often expose their lives to great risks. Thus the drinker's home is the home of misery.

6. Some people who have not studied the question very carefully say that the reason people drink is because they are poor and ignorant and miserable and have to live in wretched dwellings. This is not wholly true. The opposite is more often the truth. It is because they drink that they are poor and miserable and in distress. We know this because whenever these people get more money, instead of using it to make their homes more comfortable they spend it on more drink. **Drink causes poverty far more often than poverty causes drink.** It is important to know this, because it explains why



CHILDREN OF ALCOHOLIC PARENTS.

many efforts to improve the lot of the poor often fail. When people have acquired the habit of drinking, more prosperity means greater waste, and, even when they earn higher wages for a time, they spend the more, and in the end are worse off than ever. Poverty will always exist as long as alcohol can be easily obtained.

7. Alcohol ruins the home and through it injures the nation. It brutalizes men and degrades women and children. A house in which alcohol is used is in danger of ceasing to be a home.

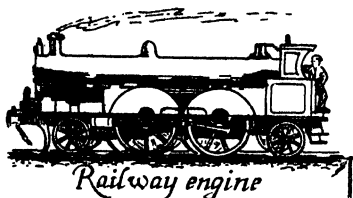
LESSON XXI.

ALCOHOL AND THE STATE: THE NATIONAL WEALTH.

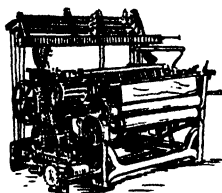
1. **Just as alcohol is the deadly enemy of the individual and of the family so it is one of the greatest enemies of the State.** By the State we mean the whole nation ; the whole body of people under one government. We have seen that when one member of a household drinks the whole family suffers. In the same way when any number of citizens drink the whole nation suffers, for the nation is just one large family and everyone has a share in the national wealth. National prosperity depends on the prosperity of the homes that make up the nation. If a certain number of families waste their money on drink they injure not only themselves but their neighbours as well, and the more numerous the drinking families the greater the national loss.

2. Alcoholism, or the habit of taking alcohol, diminishes the riches of the nation. Riches are objects, whatever their nature may be, which are adapted to satisfy

the needs of mankind. Thus corn, wheat, iron, linen, cotton, money are riches. By national wealth or riches



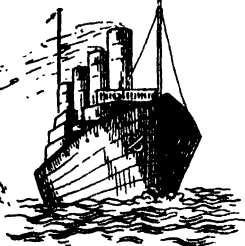
Railway engine



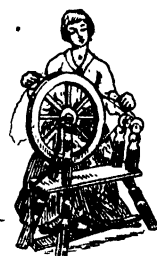
Power loom



Corn



Ships



Spinning



Iron



Coal

NATIONAL WEALTH.

we mean : (1) **The products of the soil**, corn, wheat, potatoes, etc., mineral riches taken from the earth, such as coal and iron ; (2) **Industry**, which transforms raw materials into manufactured goods, into machinery, or into food products ; (3) **Commerce**, which deals with

all matters relating to the transport and sale of goods.

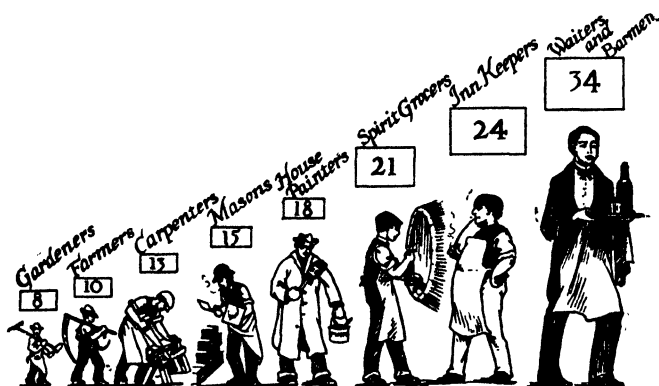
Riches, whether belonging to the individual or to the nation, may be used in various ways : (1) *By using them for their own proper purposes as coal and iron ;* (2) *By exchanging them for one another ;* (3) *By saving or thrift.*

3. When riches are used in such a way that they are of no real benefit to the individual they are called luxuries. A cigar, a glass of wine, a piece of jewellery, an unnecessary piece of dress are luxuries. The money spent on them, or, in other words exchanged for them, could be exchanged for more useful and more necessary objects. We know that mankind must drink every day to satisfy an urgent need, the necessity of quenching thirst. We know also that water is the only natural beverage, but that many persons, by habit or by liking rather than by necessity, indulge in other artificial drinks and especially in alcoholic liquors. The use of these liquors causes a huge production of them, an immense exchange of money for them, a circulation of vast quantities, and an enormous consumption. But they are drinks which mankind does not require, they are not indispensable, that is, they are not drinks that cannot be done without, they are luxuries. From the point of view of economy or saving all alcoholic liquors are luxuries, their production, their circulation and their consumption are all methods of wasting and squandering wealth.

4. The enormous sums of money which the people of the different countries pay every year for alcoholic liquors enrich only those who make and sell them. Those who consume the drink and who pay money for it do not receive in return any proper equivalent ; they

do not get any proper value for their money. **Alcoholic beverages belong to the class of unproductive riches.** Their manufacture and sale do not add anything to the material or moral prosperity of the State. Instead of adding to the national riches they decrease and diminish them.

5. But the chief thing to remember is that **the greatest wealth of any country or nation lies in its citizens.**



DEATH RATE IN DIFFERENT OCCUPATIONS OUT OF EVERY 100 PERSONS EMPLOYED.

Without them the ordinary riches of the country would be of no value. If there are not enough people to cultivate the land or to carry on industry or commerce, then the nation will not be able to develop its riches and will remain poor no matter how great these may be. There is no wealth but life, and anything which destroys life or hinders its full development is a deadly enemy to the State. There is no enemy more deadly in this respect than alcohol. It is even worse than war, for even the most terrible war must come to an end sometime, but.

alcohol goes on continuously slaying men, women and children, or spoiling their lives and preventing them from being good and useful citizens of the State.

LESSON XXII.

HOW ALCOHOL WASTES THE NATIONAL WEALTH.

1. What is waste ? We speak of a thing being wasted when it is thrown away or made useless or unproductive. If a person throws a piece of bread on the road where it gets trampled on and covered with dirt so that it cannot be eaten, that is waste of food. If a farmer has a field in which nothing grows but weeds and which he never cultivates, that is waste of land. If a man loafes about and does no work, that is waste of time. If money is spent on things that are of no use and bring no return in the way of health and comfort, that is waste of money.

2. We get examples of all these kinds of waste in the production and sale of alcoholic beverages. More of the national wealth is lost in this way than in any other. Alcohol wastes food, wastes land, wastes time, wastes money and wastes men. It is the greatest enemy of personal and family and national thrift.

2. **Waste of food in making alcohol.** Millions of tons of food materials, such as different kinds of grain, rice and sugar, are used yearly in the manufacture of alcohol. A small part of this alcohol is used, as we have already learnt, for industrial purposes, but the greater amount is used to make intoxicating drink. The food material is thus wasted, because in the processes of brewing and distilling that part of the food which nourishes and

builds up the body is almost entirely destroyed. What is left is of little value.

4. Waste of land used to grow grain for alcohol. Vast tracts of land are used to grow crops which are destroyed to produce alcoholic beverages. This land is wasted, for it does not produce grain which is used for food. This is especially serious when a country does not grow sufficient grain at home, and has to depend on other countries for a further supply.

5. Waste of money on alcoholic drinks. We have seen that money spent on drink brings poverty and misery to the individual and to the family. So with the State. The money spent on alcohol is lost, for it brings no proper return. On the other hand it causes more waste by producing large numbers of paupers, lunatics and criminals, who have to be supported by their more sober and thrifty fellow-citizens, and thus money is wasted that might be used in more useful ways. Thus the whole nation suffers.

6. Waste of time and labour in the manufacture of alcoholic beverages. A great amount of time and labour is wasted in the manufacture and sale of these substances. Many thousands of workers are thus employed who might be engaged in work of much greater value and importance. "All the labour expended in producing strong drink is utterly unproductive; it adds nothing to the wealth of the community." * Thus the nation loses the entire time and labour of a great body of workers.

7. Waste of the lives of men, women and children. Alcohol, by destroying the lives of our citizens, robs the country of its most precious possessions, and so decreases

* Adam Smith.

the greatest wealth of the nation. Even where their lives are not actually destroyed the State suffers in various ways through the intemperance of the workers. It loses the entire labour of those who become totally unfit through alcohol. It suffers through the loss of efficiency of those who become partially unfit. There is loss to both employers and workers from idleness, waste of time and material, and avoidable accidents. Most serious of all is the loss by the earlier death among workers due to their drinking habits. Thus the prosperity of the nation is impaired, for if a large number of workers in any country damage their capacity for work by taking alcohol, that nation will soon fall behind more sober and temperate nations. If it were possible for even one day to print the names of all the persons in any country who lose their lives, or are injured or hurt or made ill, by taking alcohol themselves, or by the taking of it by others, the list would probably be larger than the list of killed and wounded after a great battle.

LESSON XXIII.*

THE CAUSES OF ALCOHOLISM.

1. All the evils resulting from the use of alcohol—poverty, misery, insanity, crime, waste of time, money, food, land and human life—are grouped together under the name **Alcoholism**. This is one of the greatest scourges of mankind, affecting, as we have seen, the individual, the family and the State. The question may naturally be asked : Why do people take alcohol since

* Adapted from the *Manuel d'Enseignement Antialcoolique*, by J. Denis, Geneva.

it produces such evil results ? It is necessary to answer this question in order to understand what remedy or remedies we may apply.

2. When a doctor is called to see a sick person he endeavours to find out what is the cause of the illness. Till this is found and removed the patient cannot be completely cured. Alcoholism is a social disease of which the causes are many. It is necessary, therefore, to investigate carefully what these causes are in order to how know to remove them, or at least to deal with them in such a way as to diminish their power.

3. The first and most important cause of alcoholism is **ignorance of the real nature of alcohol and its effects on the body**. People believe that it is useful and beneficial, that it nourishes and strengthens the body, that it produces energy for work. They believe that it assists them to bear fatigue, to resist exposure and to endure cold and damp. They believe that it dispels sickness, relieves hunger and soothes the stomach. All these beliefs are false. We have learnt that alcohol does none of these things, and that, on the contrary, if its claims in these respects are examined, in every case it does the exact opposite. Why, then, do people believe the opposite of the truth ? The answer lies in the action of alcohol on the brain. It is essentially a deceiver, it deadens and paralyses the highest parts of the brain so that a man under its influence is no longer a competent judge of his thoughts, feelings or actions.

4. A second group of causes is found in **the instinct of imitation, the force of habit, and the tyranny of social habits and customs**. Many drink in order to do as others do, even when they have no wish to drink, and when there is no need to satisfy thirst. They

model their conduct upon the example of those about them and have no will power of their own. They drink merely because their companions drink. This is an especial danger to young people who have just left school and who have begun to earn money for the first time. Freed from the discipline to which they have been accustomed, and allowed to spend the greater part of their newly earned money as they please, they are apt to imitate the follies of others and so fall into evil habits. They should exercise special care at this period of their lives and so develop the character that they may be able to think and act wisely and prudently for themselves and not merely be the imitators of others.

5. A third important cause of alcoholism is **the abundance, variety and cheapness of alcoholic liquors**. Alcohol is now produced from a great number of substances; from grain, potatoes, beetroot, even sawdust. All the resources of science have been called in to assist its production and huge sums of money are expended in its manufacture and distribution.

6. A fourth cause of alcoholism is found in **the conditions under which so many people live and work**. The labourer, exhausted by his toil, the miner from the bottom of the mine, the iron and steel worker who has for hours been standing in front of a blazing furnace, those whose day is spent amid dreary and depressing surroundings, all the thousands of toilers, often badly housed and insufficiently fed; these turn to alcohol for relief, but alcohol only serves to increase their exhaustion.

7. Another cause of alcoholism is **the influence of heredity**. Alcohol not only injures the drinker but it injures his children. They have greater difficulty in resisting the temptation to drink than the children of

sober parents. Alcohol does not produce its evil effects in one generation only, but carries them on to the next.

8. Lastly, we have as a cause of alcoholism **selfishness, sensuality and vice**. The rich and idle who have no work to do and are not fatigued by any daily task are often victims of this social disease. In their case it is not misery or discomfort of body or mind that causes them to fly to this drug. They want something to gratify their appetites and procure pleasure of a sensual kind. They live on a lower level and allow their animal passions to rule over the intellectual and spiritual.

9. The causes of alcoholism are numerous, and in order to destroy or diminish this social plague we must study these causes so that we may know how to deal with them. This is a difficult task and can only be accomplished by those who are prepared to bring to it method, perseverance and enthusiasm.

LESSON XXIV.

PREVENTION BETTER THAN CURE.

1. As there are many causes of alcoholism and many ways in which the evil manifests itself, so there are different ways in which we may endeavour to lessen its harmful effects and finally destroy its influence altogether. The work to be done is so great that no one person could ever hope to do it, yet the evil can be overcome if each does his or her part towards it.

2. **Prevention is better than cure** is an old proverb and may be applied especially with regard to alcohol. It is better to prevent a man from falling a victim to the evils of alcoholism than to save him from them, for

even if the latter is possible, which is not always the case, he may have lost a great part of his money and his health, and may never be able to completely recover from the injurious effects of the alcohol he has already taken, even although he never takes any more. Young people should therefore be careful to form habits of abstinence in their youth, and should pledge themselves to abstain from this dangerous substance which the body does not require and which can never do them any good, but will certainly do them infinite harm. The formation of the habit of abstinence will strengthen the power of self-control and will help to form a strong character.

3. **Religion** will teach us to control our desires, to have the mastery over our passions, to listen to the voice of conscience, and to know what is our duty and to do it. It will help us to fight against alcoholism as against all other evils and temptations.

4. **Education** helps to form character; it gives knowledge, forms the judgment and strengthens the reason and understanding. We have seen that one of the chief causes of alcoholism is ignorance. If we learn at school the true facts about alcohol we will not go unprepared, as so many have done, to meet this great enemy of body, mind and soul. We will know that any apparent temporary benefit that alcohol may seem to produce is deceitful and that its real effect in all cases is harmful and dangerous.

5. While recognising that prevention is better than cure, and that while the clever doctor may cure the disease it is the wise one that prevents it, we must endeavour to help those who have already fallen victims to this social disease. It is necessary to do everything in our power to reform the drinker by creating abstinence

societies and by establishing places where he may be cured. We must endeavour, also, to improve the conditions in which many men and women live and work, and see to it that they have shorter hours of labour, better houses, and a reasonable wage. Thus they will have more self-respect and love of home and family, and will be less inclined to seek their pleasure in places where they are tempted to drink.

6. Wise laws may help to reduce this evil. In many parts of the world the sale of alcohol, in the form of drink, is under strict regulations and in large areas it is forbidden altogether. In many places where the sale is not completely forbidden, the number of shops where it is sold is greatly reduced, the hours during which they are allowed to be open are shortened, and habitual drinkers are punished and prevented from obtaining alcohol.

All these measures tend to restrict and diminish the evils of alcoholism.

7. "It is the duty of every good citizen to help and not to hinder his fellow-men by his own example and influence, and to endeavour to do something, however little, to improve the conditions under which people live." The strength and greatness of any country depends on its citizens. As the cells work for the cell kingdom so the citizens of any country serve the nation to which they belong. What is good for one is good for all, and what injures the life and prosperity of one citizen injures the life and prosperity of the whole community. Alcohol is the enemy of the individual, of the family and of the State. It is the duty of the coming citizens, who are now in our schools, to prepare themselves for the final victory over it.

